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AERO DIGEST, *September*, 1930.
Volume 17. Number 3

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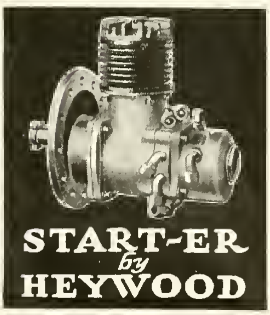

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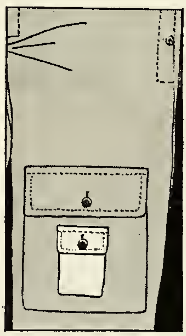

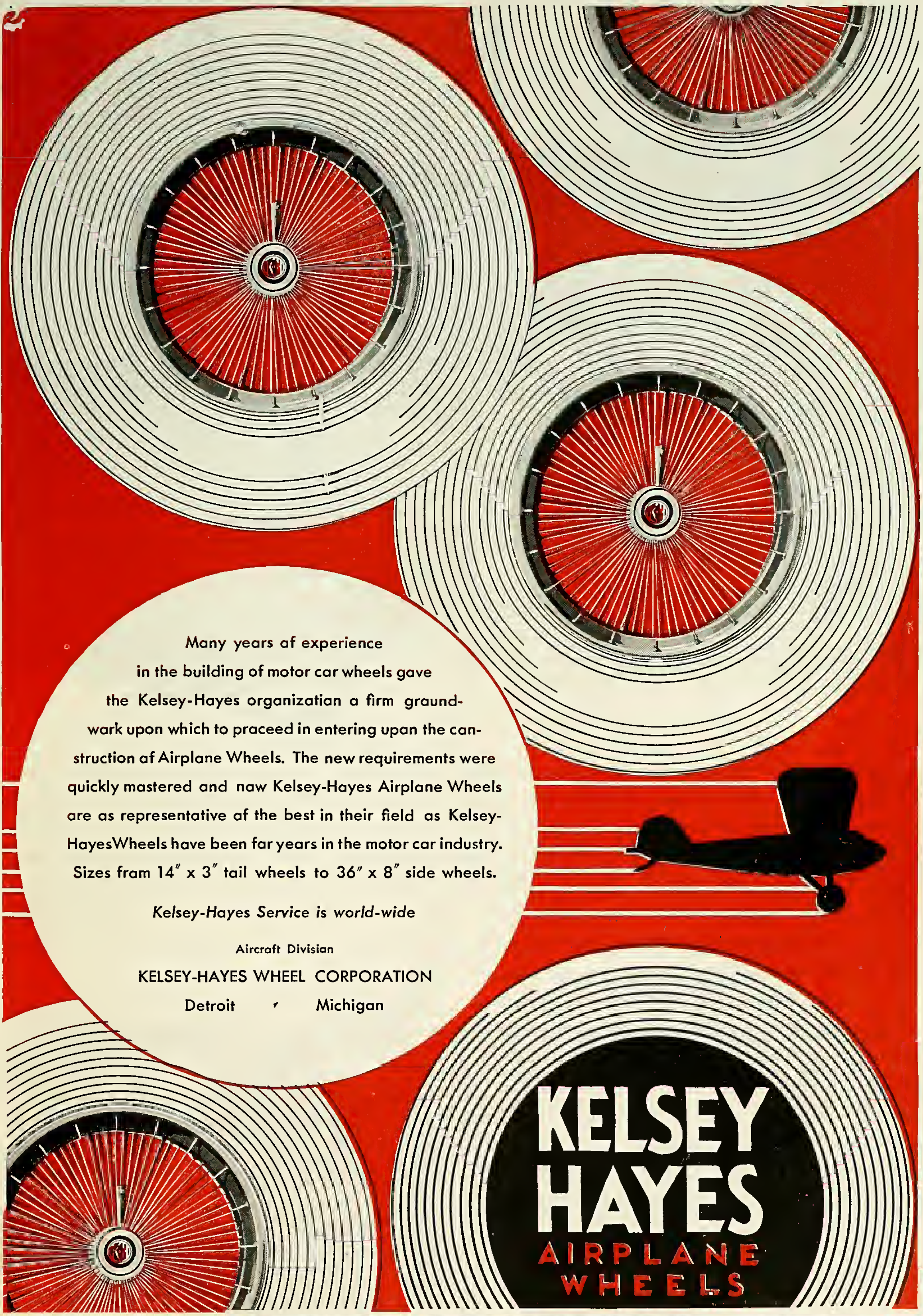
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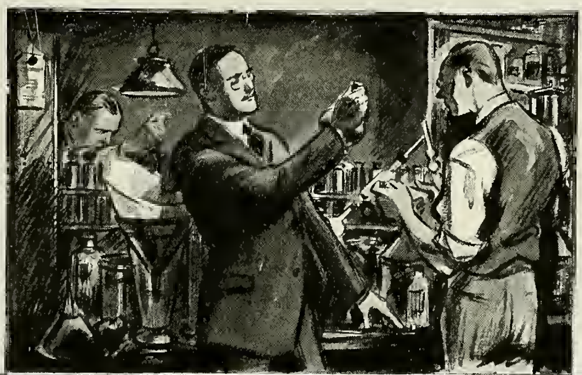

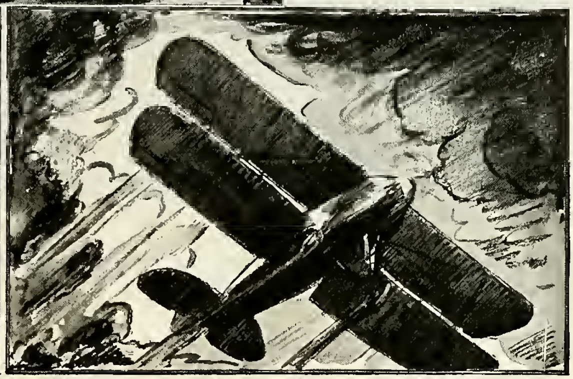

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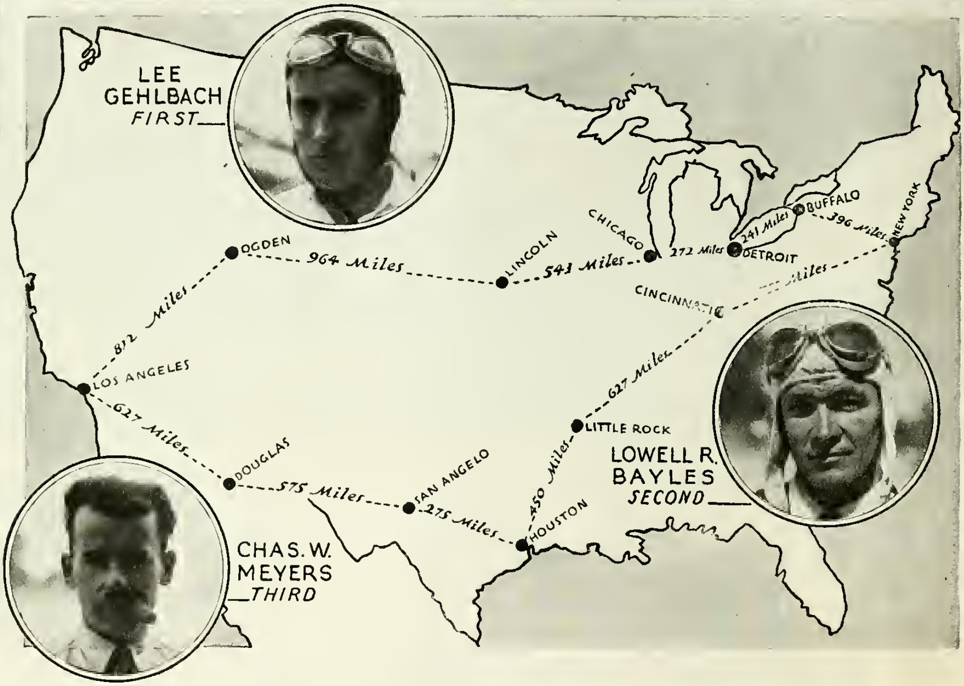
ALL AMERICA KENDALL



THE ALL AMERICA FLYING DERBY, sponsored by American Cirrus Engines, Inc., and open to all planes so powered, started out as a conventional air derby over a 5500-mile course which spanned the continent with stops at 12 control points. But right from the start, any chance of sparing the engines was set aside. The derby developed into a furious, headlong, hard-fought race, that demanded the utmost of pilot, engine and plane. Throttles were opened wide and kept there—often 300 r.p.m.'s over the rated cruising speed of the engines.

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FIRST-SECOND-THIRD

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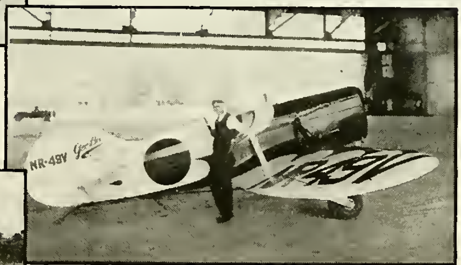
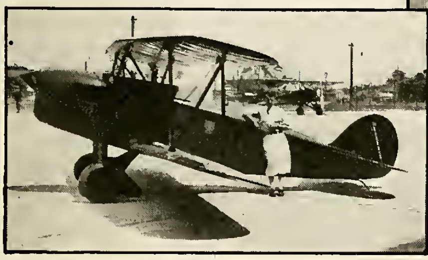
(Above) The "Little Rocket" Commandaire, with Lee Gehlbach, first prize winner. (Right) The Gee Bee Sportster, built by Granville Bros. and piloted by Lowell R. Bayles, took the second prize.





(At left) The Great Lakes Trainer, Charles Meyers, pilot, won third place in the Derby. All of the 18 entries were American Cirrus or American Ensign powered.

but never have had an opportunity to place it under such severe service as in this Derby. My motor performed just fine and I am very well satisfied with the results obtained." Meyers says: "I feel that in choosing Kendall Oil I have always been justified. Particularly in this Derby, for upon examining my engine after 5541 miles at more than the rated r.p.m.'s, the engine was in splendid condition with no appreciable wear and has gone on in service with no overhaul or replacement of parts. That is lubrication!"

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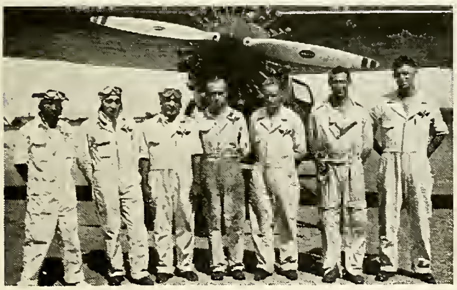

A group of foreign students. Reading from left to right: Luan Phongse-Sabhan, Bangkok, Siam; Abel Morales, Bolivia, S. A.; Edward O. Ralfe, Sherbrooke, Quebec, Canada; William F. Henderson, Montreal, Canada; Ernest M. Gilligan, Thane, Alaska; Narcisso Basso, Jr., Barcelona, Spain; William S. Crichton, Barreltan, Scotland.

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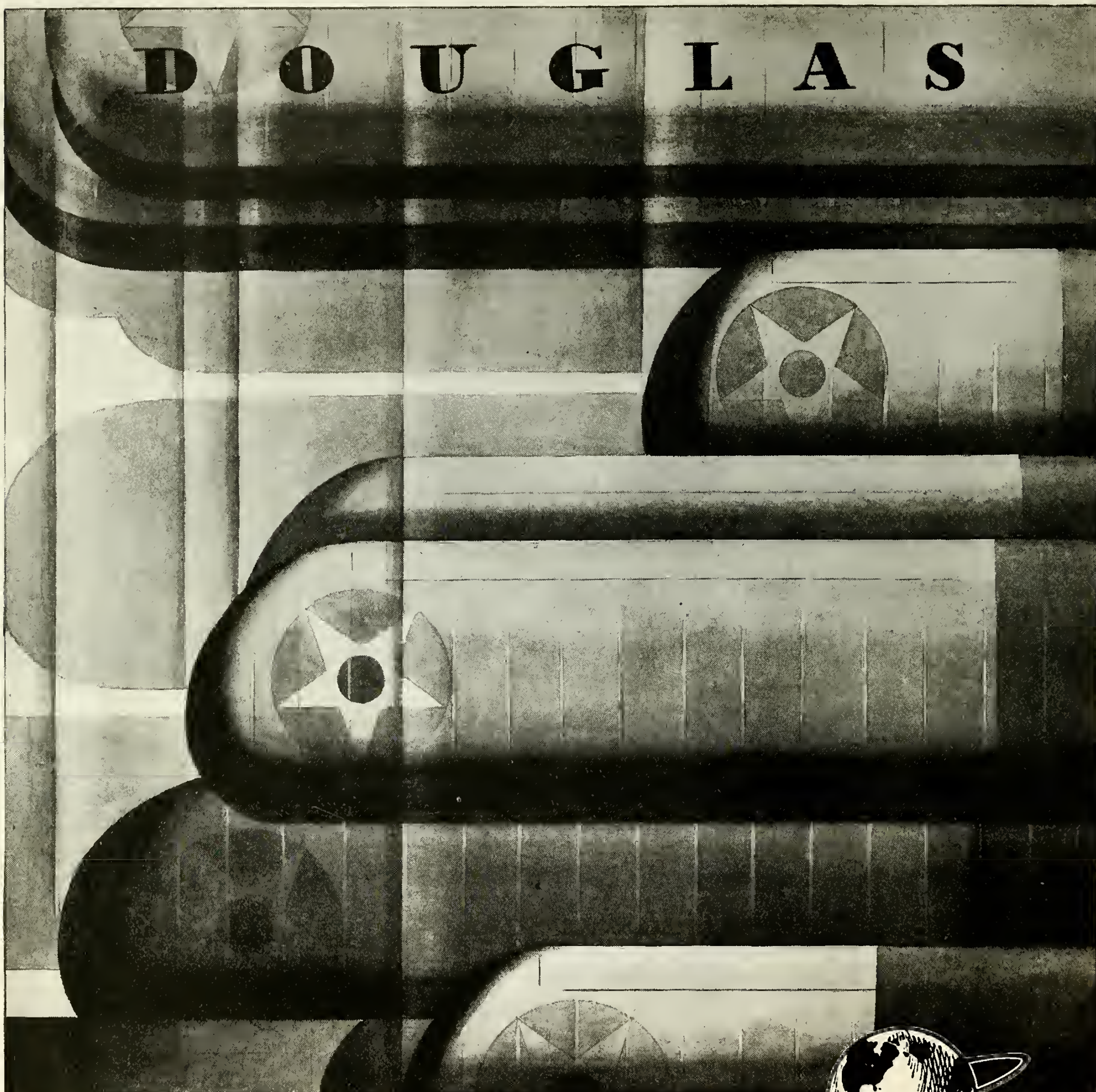

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Cover Design: Captain Frank M. Hawks' Travel Air monoplane passing the Chrysler Building, New York.

U. S. Army Air Corps Photos. See page 36 for identification

Typical Squadron and Group Insignia of the United States Army Air Corps

GROUP AND SQUADRON INSIGNIA OF THE ARMY AIR CORPS

Lieut. Roland Birnn, Army Air Corps

It was at a large airport on the West Coast. Practically all the fighting units of Uncle Sam's Army Air Corps were assembled there in an organization known as the Provisional Wing. En route homeward, after a month's maneuvers near Sacramento, they were demonstrating to the people of a Southern California city how the Air Corps operates, how the various planes fly and fight, and what the highly trained pilots can do with their machines in the way of combat, formation, bombing and other types of flying for which their planes are designed and built. On a tower near the administration building at the airport where the flying demonstration was given, two busy men alternated in watching the planes and broadcasting to the assembled crowds a description of these planes and the meaning of the various evolutions.

First on the program were the planes of the 3rd Attack Group, demonstrating how attack planes would "strafe" ground troops supposedly out on the flying field. All of the 150 participating aircraft had taken off from the field and retired to some distant point. Suddenly over the tree tops, hedge-hopping, swooped a formation of nine planes at full throttle. Speeding up to their maximum of 151 miles an hour, they dove at the field, not ten feet off the ground, and in a twinkling were gone, being in view not more than a few seconds.

"Attack planes of the 8th Squadron," came the announcement over the loud speaker. As another squadron swept past, coming from the direction the others had departed, "followed by those of the 13th Squadron" and, after a momentary pause, during which a third squadron came from nowhere and after a screaming dive departed hence "and then by those of the 90th Squadron."

To the onlookers the attack planes all looked alike; in fact, the announcement conveyed the information that they were all Curtiss Falcons. That the announcer knew in advance the sequence of the attacking squadrons and could so announce them was quite possible. Later, however, when one among the seventy-five pursuit planes then in the sky landed on the field because of motor trouble, and the announcer called its squadron as it taxied to the line, the average spectator was no doubt puzzled as to how the identification of this particular plane was so accurately determined.

When all planes were once more parked on the field at the termination of the demonstration, a closer inspection of them was made by many who had witnessed their work in the air. From a distance every plane of one particular type looked exactly alike. One Boeing pursuit plane looked like another, as did a Curtiss Hawk. One Keystone bomber looked like another Keystone bomber. One attack plane looked like another—or did they really? What was that spot on the side of the fuselage of the attack plane parked at that end of the line that made its appearance differ from an attack plane parked elsewhere on the field? Why should that mark on the nose of one bomber differ so from the mark on another bomber's nose?

"Insignia," explained one of the Army fliers. "Each group and each squadron within a group has a distinctive emblem. In fact, each flying officer in a squadron usually has his squadron emblem painted on the breast of his leather jacket. Makes it easier for his commander to gather his fliers about him for a quick conference before taking off. This, for instance," and he pointed to a bomb-throwing pirate on his jacket, "is the insignia of the 20th Bombardment Squadron, the best outfit—"

"— after the 96th Squadron," interrupted another sun-tanned flier, "the insignia of which is depicted here," and he pointed to a nose-thumbing, bomb-holding devil done in red on *his* jacket.

This sounded fine. Upon a request for more information along these lines, the inquirer was taken for a tour of the parked planes by the friendly rival airmen. Insignia, it was learned, stood for something besides a mere means of identification. Each one represented either the duty engaged in by the outfit that bore it or the achievements of that outfit, or both. Some were beautiful, artistic, some grotesque, some formal, some almost ribald. But all had a meaning.

Usually only one plane had the emblem of the group, which is composed of two or more squadrons. This was the group commander's plane. That of the 2nd Bombardment Group was significant. It assumes as its theme the recent activities of the group over the battlefields of France. Along the head of the shield are five scalloped palets, each representing one of the five major World War offensives in which the group participated—Cantigny, Aisne-Marne, St. Mihiel, Chateau Thierry and Meuse-Argonne. The center palet bears a white fleur-de-lis, symbolizing France. The shield itself is gold, with four blue aerial bombs in its center. Blue and gold are the Air Corps colors, and the four bombs are the four combatant squadrons which comprised the group. Beneath the shield is the motto *Mors Et Destruction,* appropriate for a bombardment organization.

The squadron insignia of the outfits in this 2nd Bombardment Group stand out most clearly in one's memory. The 20th Squadron has a pirate hurling a hand grenade. As he dashes to the attack he trods a horizontal aerial bomb with two bands and eleven black crosses. The two bands stand for the two major offensives in which this squadron played a leading part, bringing down eleven enemy planes while on bombing raids over the enemy lines.

The 96th Squadron has a red devil thumbing his nose at his target (whatever the target may be) on the ground. He holds in his hand an aerial bomb. The 49th Squadron insigne is that of a wolf's head, mouth open, teeth showing. War is not a gentle art, nor do these insignia as a general rule depict gentle pastoral scenes.

Not so warlike, however, are the insignia of the service squadrons of the Air Corps, those squadrons which are charged with engineering and repair work for the group of which they are a part. That of the 59th Service Squadron is a beaver, symbol of a busy life. That of the 56th Service Squadron shows a hawk with a broken wing perched on a post. That of the 66th Service Squadron shows a large gear wheel with four small gears, radiating from the master gear at ninety-degree intervals. This squadron is part of the Composite Group in the Philippine Islands and the four smaller gears represent the four squadrons of a well balanced Composite Group—pursuit, attack, bombardment and observation.

School squadrons seem to have quite representative insignia. That of the 39th School Squadron at the Air

Corps Advanced Flying School at Kelly Field, Texas, is a caricatured bird peering through a telescope. In one claw he holds a brick. This squadron is an observation school squadron, the telescope symbolizing observation aviation and the brick representing the ancient idea of a weapon. The 40th School Squadron, a bombing school squadron, also at Kelly Field, has a wedge-shaped book, showing its student members that by hard study one may wedge his way toward successful graduation. On the back is a bat, symbolizing much nocturnal activity in burning the midnight oil. The body of the bat, appropriately enough, is an earial bomb.

One school, the Air Corps Tactical School at Langley Field, Virginia, has an insigne that considers all four types of military aviation. Four lightning streaks flash from the mailed fist of Mars. One streak parallels the horizon. That stands for pursuit aviation, the mission of which is to fight aircraft in the air. Three other streaks, flashing downward toward the earth, stand for observation, bombardment and attack aviation, which carry their destructive warfare against ground troops. Included in this school's insigne is a lamp, the lamp of knowledge, appropriate for a school. The shield is divided in its background into green for the earth below, and blue for the sky above.

Another organization, well known to air-minded America, is the 1st Pursuit Group, the home station of which is at Selfridge Field. Its emblem is topped with the motto *Aut Vincero Aut Mori* (Conquer or Die). Pursuit pilots, having no defensive armament to their rear, must fight it out to the limit in the skies. To turn tail they will be lost. They must literally conquer or die. Below the motto is a shield with five stripes and five black crosses. The five stripes represent the five squadrons which the group had when it was in action; the five crosses, the five major engagements in which it participated during the war.

The 17th Squadron of this famous group has for its insigne a snow owl diving on its prey. This bird symbolizes the Arctic weather experienced five miles aloft, at which altitude pursuit planes often fight. The 27th Squadron is a hawk diving to an attack. The 94th Squadron formerly was the old hat-in-the-ring squadron, and this for some years was its emblem. Lately this has been changed to that of an Indian, his mouth distended in a war-whoop.

The insigne of the 3rd Attack Group is a pretty one. A shield contains a knight's helmet and a pair of wings, and the motto *Non Solum Armis* (Not by Arms Alone). As one young member of this group explained, "The noise of the roaring planes, diving on a bunch of ground troops scares as many of 'em to death as the bullets and bombs from the planes kill or wound." The insigne also contains nineteen black crosses, the number of enemy planes brought down by members of the group during the World War.

In this group are the 8th Attack Squadron, the 13th Attack Squadron and the 90th Attack Squadron. The emblem of the 8th is an eagle, its wings extended and holding in its claws the Liberty Bell. The 13th has a skeleton swinging a scythe. The 90th has two red dice. They have just rolled a natural.

The observation units also have their insignia. That of the 9th Observation Group, Mitchel Field, New York, is a shield topped by a crest and surmounted on a scroll. The crest is a rattlesnake entwined about some cactus. The 1st Observation Squadron, now part of the group, saw service in Mexico during the Pershing Punitive Expedition there, hence the crest. A wavy line runs down the middle of the shield, the wavy line being the Rio Grande. This group also saw service in France, participating in four major engagements, and the greatest number of enemy planes shot down in any offensive was four. The shield also bears four crosses. The scroll says simply *Semper Paratus* (Always Ready).

Among the insignia which receive much attention is that of the 11th Bombardment Squadron. It shows Jiggs, the creation of George McManus, celebrated cartoonist. Jiggs is bringing home the bacon. He is strolling along, cigar in his mouth at cocky angle. The bacon he is bringing home in this case is an aerial bomb held under one arm.

Another insigne which has been much photographed lately, because of its squadron's activities at extremely high altitudes, is that of the 95th Pursuit Squadron, stationed at Rockwell Field, San Diego, California. It shows a kicking mule, a dangerous thing to fool with.

An emblem adopted by the Air Corps detachment at Bolling Field, Washington, D. C., is that of the National Capitol. In further amplification of its pictorial insigne, each plane at this station has been named after a state.

Insignia are usually painted on the sides of the fuselage, aft of the rear cockpit. In bombers, however, they are shown on either side of the nose. Brightly colored, they stand out clearly against the somber olive-drab of the plane.

The inquiring one, who had asked the questions about insignia, was taken for a ride in one of the bombardment formations over the vicinity of the airport. He was seated in the rear cockpit, out near the tail. On either side of him, flying in such close formation that their wing tips almost brushed the tail group of his plane were two other bombers. The nose of one bore a red devil thumbing its nose. Believe it or not, it was looking straight into the passenger's face. The plane on the other side bore a wolf's head, a nasty, snarling, vicious wolf. Believe it or not again, one could see this wolf slavering at the mouth.

Until the formation loosened up, the ride was not particularly enjoyed. Insignia *do* mean something.

Key to Typical U. S. Army Air Corps Squadron Insignia Illustrated on Page 34

Air Corps Tactical School..............A
94th Pursuit Squadron..................B
96th Bombardment Squadron............C
9th Observation Group..................D
8th Attack Squadron....................E
39th School Squadron...................F
1st Pursuit Group.......................G
56th Service Squadron..................H
40th School Squadron...................I
20th Bombardment Squadron............J
27th Pursuit Squadron..................K

20th Bombardment Squadron planes

L..................66th Service Squadron
M...........11th Bombardment Squadron
N......................3rd Attack Group
O.............49th Bombardment Squadron
P..................95th Pursuit Squadron
Q......Bolling Field, Washington, D. C.
R................2nd Bombardment Group
S...................17th Pursuit Squadron
T..................90th Attack Squadron
U..................59th Service Squadron
V..................13th Attack Squadron

WHY NOT A NATIONAL AIR WEEK?

By Leon Kelley

Secretary, Fishler, Farnsworth & Co., Inc.

NATIONAL Air Week is not a new idea. I am told it has been proposed again and again in the past few years. Perhaps it is just as well for this industry that a National Air Week has never been promoted. We have passed through rather inflammable times in which almost any spark of an idea was apt to find its tinder and start a crazy conflagration of the Barnum variety. Obviously, the first consideration today should be to turn the damper against any impulses that lean toward hectic, brass-band promotion.

There may possibly be something new, however, in the method by which a National Air Week could be staged in the spring of 1931. Perhaps we have come sufficiently to our senses in aeronautics to manage such a movement after a fairly rational fashion.

I have in hand a number of recently-written expressions of opinion, from well-known aeronautical executives, which indicate how a level-headed and business-like development might be given to a National Air Week movement. Some of these executives are for, and others are against! I should like to place their remarks impartially before the readers of AERO DIGEST in open forum, as a matter of general interest. It is time to discuss National Air Week in terms of a sales campaign, for unless it can be planned by the industry at large as a sales campaign on a hard and practical basis, the proposal of a National Air Week may as well be scuttled and sunk.

A form letter was sent to thirty prominent executives in governmental and commercial aviation, inviting comment. The twenty-five replies are equivalent to the returns on a disinterested questionnaire. Fourteen favor, five definitely discourage, and three are doubtful.

Perhaps I may be pardoned for putting in a word as to how all this letter-writing got started. Early in May, just after the New York Aircraft Salon, Fred Marshall, formerly editor of the late *Slipstream* magazine, came in my office, and while discussing the show, he said, "Why not a National Air Week?" We discussed the possibilities several times thereafter, and finally decided to start some action by taking this question in a letter straight to a representative list of aeronautical executives.

By the middle of June the editors of the aeronautical press had begun to discuss the matter, and I discovered that it had been brought to their attention by N. V. Clements, of the Curtiss-Wright Corporation, who personally deserves the credit of having shaped up the first actual Air Week plan that I ever heard of.

Meanwhile, and throughout June, this National Air Week correspondence grew and grew, and provoked a number of conferences and discussions. Through all of this I perforce inquired pretty thoroughly into the subject, and I now have cause to believe that, providing it can be managed on an even keel without any reckless wild-catting, a National Air Week can be made to yield this industry very decent returns.

These letters are grouped into four sections: (1) Governmental; (2) aeronautical manufacturers; (3) the press; (4) transport operators.

From Colonel Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, we have the following encouraging comment:

"Naturally I have heard about the various 'national weeks' which are conducted for various things. However, it has never occurred to me in connection with aviation or air transportation. Doubtless they accomplish the intended purpose; otherwise, they would not be continued. I am not at all familiar with the manner in which they are organized and advanced but presumably they require a thoroughly concerted effort on the part of all the units which make up a given industry. At least this would seem to be definitely true in the case of aviation.

"Each different major industry usually has an association which represents a unified effort in the various phases of that industry. In the case of aviation, the association is known as the Aeronautical Chamber of Commerce. Perhaps you have already given them the benefit of the suggestion contained in your communication. If not, may I suggest that you do so, because I believe such a movement as a National Air Week would need to revolve around that association.

"The Department of Commerce is, of course, willing at all times to participate in any constructive undertaking which has for its purpose the advancement of air transportation."

From Major General James E. Fechet, Chief of the Air Corps, we have the following:

"Any legitimate means of bringing to the attention of the public the advantages of air transportation would of course seem to be beneficial to the development of aviation in general. However, in considering a demonstration of this character, I believe serious consideration should be given to the fact that such demonstrations oftentimes seem to impose a considerable financial burden on aviation companies, many of whom at the present time are having difficulties in keeping their business on the right side of the books. I have in mind certain criticisms made by those interested in aviation in connection with the large and varied number of aeronautical shows which are staged at frequent intervals, and which impose a considerable financial burden on the aviation companies in the way of exhibits.

"If a National Air Week is promoted, I believe that it should be staged by and confined to commercial aviation. I believe the time is fast approaching when commercial aviation will have to stand on its own legs by indicating the advantages which it offers to the public without the assistance of the more spectacular phases of military and naval aviation which, in the past, have been a popular means of assistance in stirring up interest in aviation."

A similar comment was received from F. Trubee Davison, Assistant Secretary of War, who likewise stressed the need of promoting a National Air Week for and by commercial aviation exclusively. Mr. Davison added: "However, should this matter take a definite form and there is any way in which I can help, I shall be glad to do so."

From the point of view of the Post Office Department, as expressed by W. Irving Glover, Second Assistant Postmaster General, the suggestion of a National Air Week does not seem as yet acceptable. "Naturally," Mr. Glover writes, "I am very much interested in any means to fur-

(*Continued on page* 172)

RADIO on the WORLD'S AIRLINES

By

Herbert Hoover Jr

Chief Engineer, Western Air Express

TWO-WAY communication between airplanes and the ground has been an accomplished fact for many years, the first successful experiments dating back to about 1913. During the war the work was carried on intensively for naval and military purposes, and much valuable experience was obtained. With the end of hostilities, however, development temporarily stopped because there was little demand for apparatus. It was not until 1929, when commercial aviation gave indication of attaining large proportions, that experimental research on the problem was again resumed in earnest. At the present time most of the large transport companies in this country are either operating two-way communication successfully, or are making plans for installation in the near future.

Pilot speaking into microphone on W. A. E. mail ship. Control buttons on stick

Before going on to a description of several of the larger systems in this country, it is interesting to outline briefly the developments that have taken place abroad. The Imperial Airways in England, the K.L.M. lines in Holland, and the Luft Hansa in Germany have been using radio successfully for many years. Their early start is principally accounted for by the fact that commercial aviation was heavily subsidized after the war, and had become more or less stabilized about seven years before it assumed similar proportions in the United States.

Almost without exception long waves have been used in Europe, both on the planes and at the ground stations. This is mainly for the reason that when the use of radio was first started the value of short waves had not been proved, nor had suitable apparatus been developed. Having once installed long-wave apparatus, it has been deemed inadvisable to make any major change in equipment or methods of operation.

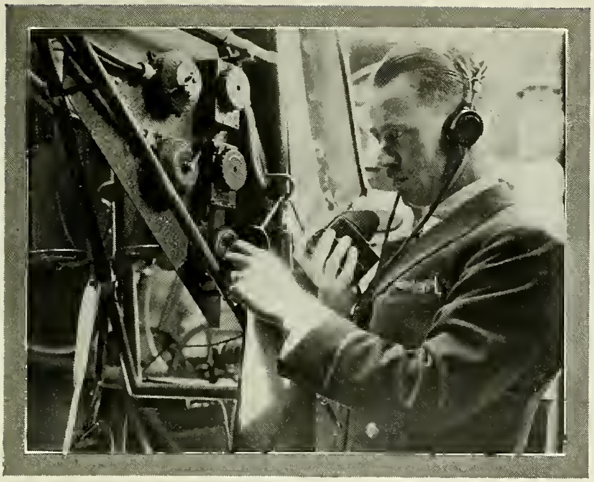
Since the development of aeronautical radio in the United States came later, however, it was possible to use short waves, with a number of technical advantages. Furthermore, most of the longer waves were already occupied by other services, and it was only on short waves that enough channels were available to care for the natural growth of the industry.

Communication station, Boeing System, showing radiotelephone apparatus, microphone in operator's hand, and teletype

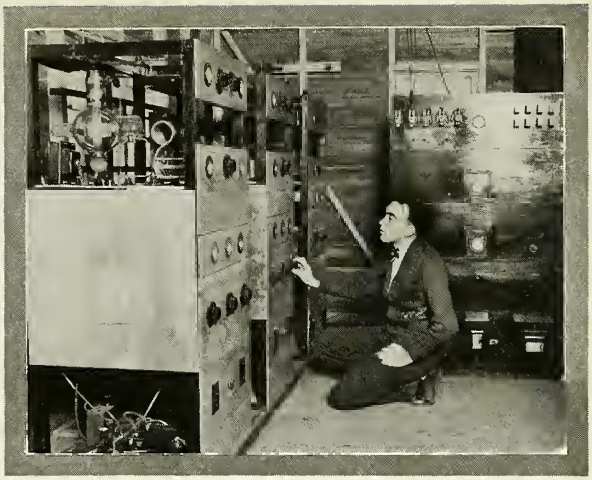
In Europe radio has been used for navigational purposes, as well as for communication, but in a different manner than is common in America. At important points such as Croydon, Amsterdam, Berlin, and Le Bourget signals from the planes are received on directional antennas, and a compass bearing on the position of the ship can be determined. The bearings from two or more airports are then plotted on a map, and by triangulation the position of the plane is computed and radioed back to the pilot. For satisfactory operation it is essential that at least one of the ground stations be considerably to the right or left of the normal course that is being flown, so that the progress of the plane along the airway can be definitely checked. If bearings are taken only from the points of departure and destination, and the plane follows a straight course between them, it is apparent that there will be no change in the bearings during the entire flight. Although this would be a serious drawback to the use of such a system in the United States, where the majority of our airways are long and straight (with few opportunities for taking bearings from stations off the route), it is nevertheless well suited to aviation in Europe. Over there the flying is concentrated into a relatively limited geographical area, and as a result, an airplane is nearly always within range of two or more airports that can advantageously furnish bearings. Whereas in Europe only about fifteen ground stations are necessary to cover practically all the civil flying that is being done, it has been estimated that in the United States at least 150 stations would be required to give an equivalent degree of service.

There are several important disadvantages to the European system which should be kept in mind. First the time required to take the bearings, obtain the reports from the other receiving stations, compute the position, and radio it back to the pilot may amount to ten minutes or more. This is a serious consideration in aviation, when it is realized that the plane will have traveled twenty miles or more in that period. The second disadvantage is that the number of planes that can be served simultaneously in a given area is somewhat limited.

The European system was an outgrowth of a method that has long been used in marine navigation. It is only necessary to listen to the boats around New York harbor on foggy days, all requesting bearings at the same time, to realize that these disadvantages are very real ones. On many occasions it is necessary for a boat to wait for an hour or longer before its turn arrives to have a bearing taken. An airplane, unlike an ocean going vessel, cannot wait around outside the harbor, or grope its way along at reduced speed—it must keep on going at about a hundred miles an hour all the time. There are already several regions in this country where ten or more transport planes



Pilot G. Clark operating radio in Western Air Express Fokker F-32. Pilot normally controls apparatus from seat



Radio transmitters (code) at W. A. E. Airport, Alhambra, Calif., for use in inter-airport communication

are in the same area simultaneously, and the number will undoubtedly increase appreciably in the years to come. It is safe to conclude, therefore, that the European system of radio navigation could have only a limited application to aviation in this country.

The Bureau of Standards, realizing the limitations of that system, developed the radio beam method of navigation which has already been described in earlier articles of Aero Digest. With this type of beacon, any number of airplanes may fly along an airway simultaneously, each of the pilots having an instantaneous and continuous check on the course he is following.

The chief point of difference between aeronautical radio in Europe and the United States, however, is in the field of two-way communication. In Europe all of the ground stations are owned and operated by government agencies, or by the Marconi or Telefunken interests. The equipment on the planes is usually leased by one of the latter two companies to the air transport concerns operating in their respective territories. The transport operators have no control over the apparatus or radio man on the plane.

In the United States the transport companies have themselves taken an active part in developing the use of radio. Through the Federal Radio Commission wavelengths have been assigned directly to them, and they have taken the initiative in working out the best type of system suited to their needs. They have purchased and installed all of the two-way equipment at their own expense—both at the ground stations and on the airplanes—and they have individually undertaken the entire responsibility for this phase of the radio on their respective routes. The governmental authorities have given them much latitude during this early period of operation.

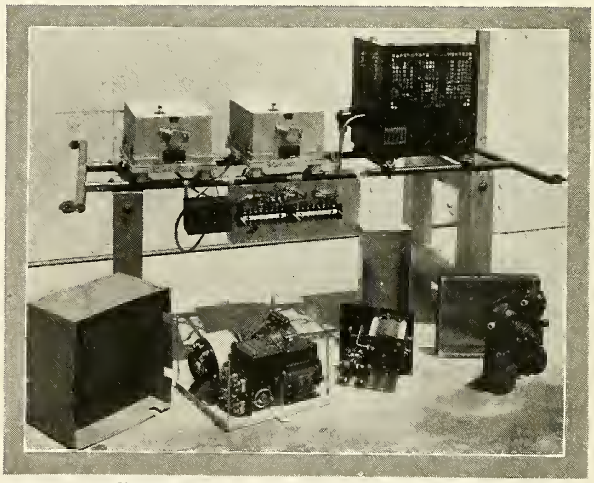
One of the first of the domestic transport companies to make use of two-way radio was Transcontinental Air Transport. At the time operations were commenced, in July, 1929, commercial short-wave telephone apparatus was not available, and therefore a long-wave telephone system was installed. Seven ground stations, similar to the Department of Commerce weather broadcast stations, were erected at Columbus, Indianapolis, Waynoka, Clovis, Albuquerque, Winslow and Kingman. Temporary arrangements were made at St. Louis, Kansas City, Wichita, Los Angeles, and Oakland to use the Department of Commerce long-wave stations for working planes when they were in the latter territories. The T.A.T. stations and planes operate in the 700-meter band on five channels which have been temporarily set aside for aviation by the Federal Radio Commission.

The commercial equipment purchased for the planes was found to be unsuitable after a brief period of operation, and apparatus of the company's own design and manufacture was substituted. The engineers who have been responsible for the successful performance of the radio on this system deserve much credit, particularly in view of the severe handicaps which were overcome at the beginning of the operations. It is logical to expect that eventually the long-wave equipment will be replaced by short-wave apparatus in order to comply with the general aviation program of the Federal Radio Commission, in which it is planned to have all two-way communication on short waves.

T.A.T. has been using a leased teletype circuit for communication between its airports, offices, radio stations and weather observers. A complete weather reporting system has been built up covering those parts of the route which are not served by the Department of Commerce.

The Boeing Air Transport, in coöperation with the Western Electric Company and the Bell Telephone Laboratories, began in 1928 the development of two-way radio telephone apparatus for use on short wavelengths. The equipment became available in commercial quantities early in 1930, after having been tested and improved upon for

(*Continued on page* 168)



Complete radiotelephone two-way communication apparatus for installation in a W. A. E. Fokker F-10 transport

The PRINCIPLES of AERODYNAMICS

ARTICLE 3—PRESSURE

Dr. Max M. Munk

THE good old English term "pressure" needs no definition. Pressure is that which swells the automobile tire and makes the steam boiler explode; it is the particular action of air or steam producing these results.

The pressure of the atmosphere at sea level under standard condition is 2,117 pounds per square foot. In the vicinity of a flying airplane the pressure is different. There is a greater pressure under the wing than on top of it; otherwise the airplane would not be supported by the air. Estimated on the basis of the total weight of the airplane, the wing loading is usually ten to fifteen pounds per square foot of wing surface. In level straightaway flight this wing loading is equal to the difference in the pressure on the upper and lower sides of the wing. The atmospheric pressure lies somewhere between this, and for the average pressure difference relative to the pressure of the undisturbed atmosphere we may allow ten pounds per square foot. The maximum of this difference is larger than the average, and we will assume for our purposes that it is thirty pounds per square foot, as against 2,117 pounds per square foot for the original atmospheric pressure. This shows that the pressure variations caused by a flying airplane are hardly one per cent of the atmospheric pressure. The density of the air which is proportional to its pressure, will therefore also not vary more than about one per cent. This estimate substantiates the soundness of the usual assumption of constant density of the air, so far as the air surrounding the airplane is concerned. A region of low pressure is often referred to as a "vacuum," meaning emptiness. Actually, the pressure in such regions is only about one per cent less than in the regions of undisturbed atmosphere. The expression "vacuum" is therefore somewhat misleading. Even the term "partial vacuum" is not particularly good; the vacuity, if any, is not essential at all. But after all, every expression is equally good as long as those who use it are conscious of the intended meaning—which in this case is region of low pressure.

Nobody can say positively how great the atmospheric pressure really is, because it depends on the choice of the pressure zero from which it is measured. In ordinary physics the pressure in a vacuous vessel is assumed to be zero. It would be inconvenient to use this same standard in aerodynamics; we should then be compelled to deal with pressures between 2,100 and 2,300 pounds per square foot. Since it is much more convenient to use small figures around zero, however, it is universal custom to measure aerodynamic pressures from the pressure of the undisturbed atmosphere which is taken as zero. Pressures smaller than the atmospheric pressure (vacuums in popular language) are then indicated by negative figures, though the actual air pressure is always positive in the physical sense.

The pressure created by moving air, and the air forces resulting therefrom, are not phenomena extraneous to the air forces associated with the change of the state of motion of air; they are identical with the latter, which are merely manifestations of the pressure set up. In a great many cases it is actually possible to compute the pressure distribution from the air motion. I shall explain this now for the steady motion, because that is sufficient for practical application.

In steady flows air moves as if it were guided by invisible tubes. It flows slowly through wide cross-sections of these tubes and rapidly through narrow cross-sections. This shows that the velocity is necessarily different from point to point, unless the streamlines are of primitive and special pattern.

When the air changes its velocity from V_1 to V_2 while proceeding from the point 1 to the point 2, it is doing so with the average velocity $\frac{1}{2}$ $(V_1 + V_2)$, the arithmetic mean of the two end velocities. The mass of the air passing through a narrow tube with unit cross-section is therefore $(V_1 + V_2)\ \varrho/2$. Then the force associated with a change of the motion, equal to the product of mass and change of velocity, is $(V_1 - V_2)\ (V_1 + V_2)\ \varrho/2 = (V_1^2 - V_2^2)\ \varrho/2$. This force is equal to the force of the pressures p on both ends, and since the cross-section was assumed equal to unity, equal to the difference of these two pressures. This gives the fundamental equation $(V_1^2 - V_2^2)\ \varrho/2 = p_2 - p_1$ or otherwise written $V_1^2\ \varrho/2 + p_1 = V_2^2\ \varrho/2 + p_2 =$ constant.

The usefulness and importance of this interesting and direct and simple relation between the pressure at each point and the velocity is a rich reward for the short computation we had to make. Stated in words it amounts to this—the sum of pressure and of the expression $V^2\ \varrho/2$ is the same at the two points considered and hence the same at all points of the streamline of the steady flow considered, since we did not make any particular assumptions restricting the choice of the points 1 and 2. We must remember, however, that the friction forces, which we have not considered, may bring about some change in this simple relation.

The steady flow created by the airplane begins far ahead of the airplane, and has parallel and constant velocity at all points. All streamlines begin in that region. All streamlines have therefore the same constant sum of the pressure and the expression $V^2\ \varrho/2$ in that distant region, since the pressure and V are constant. From this it follows that this value is constant over a larger region than just one streamline; it is constant over all streamlines, and hence it is universally constant throughout the entire flow.

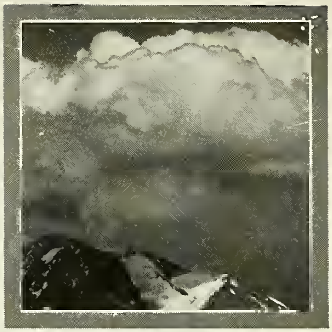
What we have found without any intricate mathematical analysis amounts to a general relation between the velocity and the pressure. The pressure can be directly computed from the velocity, and vice versa. Although it may at first appear surprising, it is nevertheless proved by theory and confirmed by experience that the higher the velocity, the lower the pressure; and the lower the velocity, the higher the pressure. Yet, this is really quite plausible, if we think it over, because the air has a natural tendency to speed up when flowing to a region of smaller pressure, and to slow down when overcoming a pressure rise. Pressure is to air what a hill is to water—its speed increases when it is flowing downhill.

The relation $V^2\ \varrho/2 + p =$ constant, is of such importance in all aerodynamic pressure computations that custom has developed names for the expressions that naturally and originally were without names. First there is the curious fact that the pressure has a natural limit, a maximum that cannot be exceeded. The velocity of the air cannot be smaller than zero, and at points of zero velocity where it (*Continued on page* 184)

CLOUD NOMENCLATURE FOR PILOTS

Martin L. Dobler
Member, American Meteorological Society

Courtesy of Fairchild Aerial Surveys, Inc.
Alto-Stratus

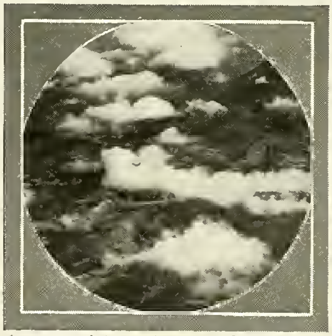


Courtesy of Fairchild Aerial Surveys, Inc.
Cumulus

CLOUDS are the "storm signals" of the sky. Often they tell us of an approaching disturbance, even long before the barometer begins to fall. I refer especially to the cirrus clouds. Consequently, it behooves the pilot, as well as the layman, to familiarize himself more thoroughly with the aspects of our various cloud types and to inquire as to their ceiling levels, their structures and what they foretell.

Therefore, let us consider and study briefly, one by one, the different forms of clouds. To follow a somewhat logical sequence, we shall begin at the very top, so to speak, starting with the most prevalent type of all seasons, the *Cirrus*—after which we shall come down step by step, until we have reached the very lowest clouds, the *Nimbus-scud* or rain clouds.

The *Cirrus* clouds may be readily identified, for they are distinguished from all the others by their "plume-like and feathery" nature. What fantastic shapes they form, as they sweep over our skies at altitudes between 20,000 and 30,000 feet! These clouds usually foretell coming rains and a falling barometer in about two to three days following their first appearance, sometimes even sooner.



Courtesy of Fairchild Aerial Surveys, Inc.
Fracto-Cumulus

With but one or two exceptions, their drift is usually with the westerly winds. At the exceptional times they may be observed occasionally at these higher altitudes coming in from a southerly or southeasterly direction, in connection with a tropical storm over the West Indies in August or September, or in connection with a marked disturbance which is central off the Atlantic Coast and is moving north or northeast.

The *Cirro-Stratus,* which are quite similar in structure to the cirrus, are to be seen at about the same ceiling levels. As their name signifies, these clouds are more in strata or layers than isolated, and are often seen in the winter months, advancing from the southwest, quite frequently being precursors of approaching northeast snow and sleet storms.

Courtesy of Fairchild Aerial Surveys, Inc.
Strato-Cumulus

The *Cumulus* cloud family, which is perhaps the most familiar, is characterized by massiveness. Those "mottled," rounded masses of cloud formations, which may be observed at about 12,000 to 15,000 feet, are the alto-cumulus or cirro-cumulus, the highest of this particular family. They, too, usually move along with the westerly winds. It is to these clouds that the old adage is ascribed, "Mackerel sky, mackerel sky, never long wet, never long dry."

The *Strato-Cumulus,* which are lower down in the ceiling level, are the great "fair-weather" clouds. During the approaching autumn months, especially on brilliant, cool days in October, one frequently can see at about the 6,000 to 8,000-foot levels these "glorious marching columns"—row upon row, layer after layer of these white, ragged, wind-torn clouds. They presage the approach of rising barometer and colder or cooler weather, according to the season. The pilot will sometimes note a bit of turbulance in these clouds if the winds aloft are strong from the west and northwest.

The *Fracto-Cumulus,* which are prevalent on exceptionally windy days, are quite torn looking. Nevertheless, they are likewise "fair-weather clouds" and may be observed at approximately the same ceiling as the strato-cumulus.

The *Cumulus* are those truly majestic, towering and "boiling" formations appearing on unusually warm days, at altitudes of 5,000 to 8,000 feet. Normally they soon become massed into great thunderheads, and resolve themselves finally into the typical thunderstorms and line-squalls. Since there is a very marked turbulance in these cloud masses, the pilot will experience severe bumpiness when they are in process of formation.

The *Stratus* or gray sheet clouds, foretelling early rains, are to be found from the 5,000-foot down to the 2,000 or even 1,000-foot levels. In flying in the vicinity of these clouds, I have noted but little if any turbulence.

The *Nimbus* are the low, rolling in, "oily-looking" masses of dark clouds, denoting heavy rains. They usually are accompanied by northeast and easterly winds, at surface and aloft up to 3,000 or 4,000 feet. Their altitude usually is, however, approximately 1,500 to 2,000 feet, regardless of season.

The *Scud,* the lowest of all types, are torn fragments of clouds at elevations of 1,000 feet down to 300 feet or lower—skimming along under the nimbus. They indicate excessive rains and dangerous northeast and easterly gales, being more frequent in autumn and winter.

Courtesy of Fairchild Aerial Surveys, Inc.
Alto-Cumulus

HAPPY DAZE

By Caldwell

BACK in the days when I was sixteen—this was shortly after the Civil War—I was one of the wildest lads in the country. Of course, I've failed a lot since, and now am one of the tamest, but in those days I was regarded as one of the local menaces—and careful mothers called their daughters in when I was observed passing the house. Any devilment pulled off within the confines of the county was blamed on me, even if I had no part in it. In fact, on such gala occasions as Hallowe'en Night, when the outdoor telephone booths so affectionately described by Chic Sale were overturned in wholesale lots, I was credited, and rightly, with the overturning of most of them.

Well, well, those were indeed the happy days. I often look back at them with longing for their return and fond regret for their passing. You know, I'd quit school when I was fourteen—and haven't had any schooling since—and I had been working at odd jobs for two years. But I really hadn't got over my childhood tricks; I hadn't got the habit of working seriously and with a purpose. I still haven't got it, for that matter, more's the pity. But in those days I was pretty nearly a hopeless proposition from an employer's standpoint. In two years I had twenty-two different jobs with twenty-two different employers. I averaged less than a month with each. One fellow holds the record for employing me for two months, but the others took me on for periods of a month down to as short a time as two hours. The smartest one of the lot was the fellow who fired me after two hours, and even he wasn't as intelligent as those who refused even to try me.

Well, I don't want to give you the impression that I was a bad egg, for I wasn't. I was simply a big, overgrown, healthy young colt who was feeling his oats, and naturally was inclined to kick over the traces when harnessed up for work. I had no more idea than a colt has that life was earnest and that I was supposed to pull my share of whatever load Fate should pile on the world's wagon of work. I was out for diversion, and the devil could fly away with the rest of it. Those were happy days, and I was in a happy daze.

Now, folks, it seems to me that what I was, back in those days, is pretty much what aviation is today. Among the tried and true old work horses of industry, especially the transportation industry, aviation is a frisky, skittish young colt, kicking up its heels and doing its best to upset the wagon. Which perhaps would be all very well, only the passengers are noticing the fact and are cautiously refusing to ride in the wagon. They're saying to themselves, "Now there's a fine young colt, full of pep and promise, but it's still a colt and just as apt as not to drive its heels through the dashboard. I guess we'll ride behind the old grey mare for a spell yet. Giddap, Pullman!"

Returning to a survey of my long-past youthful self—and then dumping me out of the picture—it's enough to say that I did finally grow up, or grew up as far as a person of my temperament was capable of growing. You see, I noticed at last that I wasn't eating regularly. The periods in between jobs were periods of partial starvation that were peculiarly aggravating to one of my staunch appetite. I noticed at last that in order to eat regularly I had to work with at least a fair degree of regularity, and not get kicked out every Saturday. So purely for my own comfort, and not because the world expected it of me, I put my kid tricks and exuberance in the background and settled down to work, more or less. Since which I have never failed to eat three meals a day, and of late have been growing annoyingly stout, despite almost an hour's work a day.

Before aviation and those in it are going to eat regularly, they're going to learn what I learned years ago—that wild pranks are all very amusing but you don't get paid anything for them.

Let's take a penetrating look at aviation from the viewpoint of the people whom we hope will support it—the great mass of the public who don't know anything about it except what they read in the papers. Remember, we're not looking at it now as pilots, as airline executives, as factory owners or other readers of AERO DIGEST—we're looking at it with the eyes of that part of the public who can afford to support aviation if they consider it useful and safe and convenient for them to do so.

We are now, we'll pretend, that section of the public who could use a plane, the comparatively small section who can well afford to pay the prices we must demand at this stage of aeronautical development. We are bankers, lawyers, business men, people with some money and standing, which means as a rule people of some little common sense—or someone with more sense would have got our money or our job away from us. We have a home, even if it's heavily mortgaged; we have a good car, even though it's half worn out and only half paid for; we travel at times, and always with the most comfort we can afford; we take a Pullman berth always, and frequently we buy a section or a compartment. Our time has some little value to us, and we would be willing to pay slightly more than railroad and Pullman charges if someone could save it for us. In short, we are the upper financial fringe of the great middle class; we are not the rich and we are not the poor. There are not enough rich to support aviation, and the poor cannot afford to; if it is to be supported, folks in our class—the class we are supposing ourselves to be now—must support it.

Are we all set to take that viewpoint? Then here it is, as I see it. We are Mr. E. Pluribus Publico, substantial American citizen, with a home, a good car, a rented cottage at the beach for the summer, one wife, three children and a secretary. In our business we cover each four months several states, and we're anxious to get back to our home, our car, our family, and possibly our secretary—who knows? We know all about trains—confound them!—we know how hot they are in summer and how slow and tiresome they are always. If we could spend less time, or even no time in them, we'd be much obliged.

A friend mentions flying—and of course we've been reading of aviation for years. A very interesting and brave adventure it appears to be, from all accounts. But the friend says, "Why don't you fly there on the airline? Or, better still, you do a lot of traveling, so why not fly your own plane? You'd save time."

"What!" We're shocked at (*Continued on page* 176)

COAST-TO-COAST IN HALF A DAY

By Captain Frank M. Hawks

Superintendent, Aviation Div., The Texas Company

Captain Hawks after his record-breaking flight

FOR some time it has been my ambition to cross the continent from Los Angeles, California, to New York City in twelve hours, and although my record time of less than twelve and one-half hours on August 13 is satisfactory for the present, after the races in Chicago I plan to make another attempt at lowering this mark still further. At no time during the recent flight did I have my engine wide open, and I know my little red and white Travel Air monoplane is capable of better speed than would be required to set up a new record. Consequently, in the fall with stronger tail winds and clearer atmospheric conditions, a flight over the same course within twelve hours should be easily accomplished.

Weather conditions on the day of my recent West-to-East flight were very nearly ideal. My tanks were loaded with eighty gallons of Texaco aviation gasoline and ten gallons of Texaco No. 2 lubricating oil. I took off from Glendale Airport, Los Angeles, at 6:16 a. m. (New York time), crossed over San Bernardino Range through a pass at 4,000 feet and followed a northeasterly pass until reaching the Mohave Desert. Then heading east, I crossed the Colorado River into Arizona. My speed up to that time was greater than three miles a minute, and I continued climbing. It was still dark when I passed the National Forest of Arizona; I could see below me the lights on freight trains plugging along at about twenty miles an hour.

The sun began to rise as I passed Flagstaff, Arizona, where I hoped to pick up a favoring wind. The air was perfectly calm, however. Speeding past Mount Taylor, I headed toward the field at Albuquerque, New Mexico, where I made my first landing. It had taken three hours and twenty-six minutes to cover the first leg of the hop. Mechanics were waiting to refuel the ship, and after a fifteen-minute stop for this purpose, I took off again.

Shortly after leaving Albuquerque a thirty-four-mile tail wind added to my speed and followed me for about 300 miles. I kept climbing to 10,000 feet, heading for the Texas state line at its northwest tip, over northern Oklahoma and up into Kansas. My speed on this leg of the journey was the fastest of the entire trip, bringing me to the second landing field, at Wichita, in two hours and twenty minutes. I was then half-way across the continent, five and three-quarters hours after leaving Los Angeles.

A weather report handed me at Wichita advised of storms in the region of St. Louis. Leaving Wichita at 12:36 I traversed the rest of the state of Kansas, and after crossing the middle of Missouri, hit the rain near St. Louis as had been predicted. The downpour was not severe, however, and I climbed above it and headed for Indianapolis. Cross winds prevailed from the Mississippi eastward, and hazy weather spread like a blanket from there to New York, making the ground barely visible at 8,000 feet. I landed at Indianapolis at 3:22. This part of the trip from Wichita had taken about three hours.

After leaving Indianapolis at 3:35, I began to get hungry but estimated I should be in New York in time for dinner. Flying north of Dayton and Columbus and across the hills of Pennsylvania, though I still fought a cross-wind, I was making a speed of nearly four miles a minute. I could see the dark haze surrounding Pittsburgh and the dark ridges in the Alleghany Mountain region.

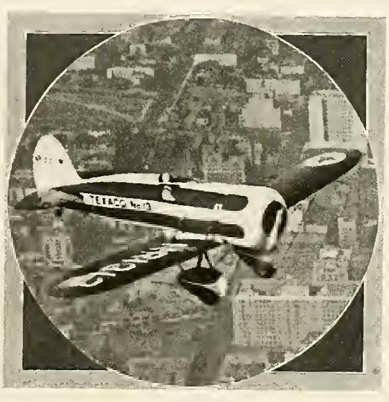
Crossing the Delaware River in the late afternoon, I could see the Atlantic Ocean, and soon the tall towers of Manhattan became visible. Over New York I started to dive straight for the airport at Valley Stream, which I circled before coming in for a final glide and a fishtail landing at seventy miles an hour.

Official timers at the field clocked me in at 6:41:30 p. m. (Eastern Daylight Saving Time), the flight having been accomplished in twelve hours, twenty-five minutes and three seconds, the fastest time ever made for the transcontinental flight. The actual time in the air during this flight was eleven hours, forty minutes, three seconds, for each of the three refueling stops consumed fifteen minutes. On this flight of 2,510 miles, my ship with its 300-horsepower special supercharged Whirlwind engine never traveled less than 200 miles an hour and on some stretches attained a speed of 260 miles an hour. The average speed for the entire trip had been about 215 miles an hour. I had flown all the way with the engine turning up 2,150 revolutions per minute. The oil temperature never exceeded sixty-five degrees Centigrade.

I carried a slide rule so attached to the instrument board that it could be manipulated with one hand; with this instrument I was able to make quick computations of speed and drift.

One gallon of oil was put in the tank at Albuquerque, none at Wichita and four gallons at Indianapolis. At each refueling stop the 109-gallon gasoline tank was filled with 80 gallons; when I landed, twenty-five gallons remained.

The flight shows something of what can be done in the way of establishing a sort of "pony express" for the transport of bonds and other valuable documents across the country. On such a service the flight from West to East would always be faster than the flight from East to West, because of the prevailing westerly winds. The flier from the West, however, riding against the sun, would have to start in darkness, whereas the East-to-West flier would have longer sunlight.



Hawks in flight over California

STOP AND PAY TOLL

By Don Rose

AS I sit by the cracker barrel or the chunk stove, combing memories of old times out of my long white whiskers, I recall the good old days when distances on our American highways were measured in the number of toll gates to be negotiated or evaded. I remember that twenty years ago we lived six toll gates from town, though a smart driver who knew the side roads could make it in three. And I remember the local enthusiasm and excitement when our own nearby toll house actually burned down, probably because some progressive person put a match to it. It never went up again, and I recall that in subsequent years several others burned down also.

That seems like a long time ago, but the last stretch of toll pike in Pennsylvania was freed for public use only last spring. But that was the end, and there are mighty few toll gates left on real roads in these United States. The change to free public highways is so thorough and conclusive that the Bucks County Historical Museum—one of the most interesting and unique collections of early Americana in the country—considers it necessary already to exhibit a genuine toll gate, with its warning sign and other accessories, as an improving lesson to the present as to how our ancestors once lived and moved about their business.

The first automobile that squeaked and rattled its way out into the country was singing the swansong and death knell of the toll road. Fast travel couldn't possibly be bothered with a gate to be opened and a tax to be paid every few miles, and when automobiles began to breed like Japanese beetles throughout the length and breadth of the land, the state had to take over the roads, build and maintain them, and pay for them from the public treasury. We still pay toll, of course, for the use of the roads. But we pay it with our gasoline mileage, with our license fees and in sundry other indirect ways. We don't stop every now and then and scratch around in the trouser pocket to pay for a few more miles of travel.

Most of my youthful readers will never know what fun they have missed by being born to the concrete and the state highway. I don't know much about it myself, since I did no driving of automobiles in the days when their principal accomplishment was to make a horse stand on its hind legs and spout fire and brimstone. But I discovered what tolls will do to travel when I went some years ago on a trip to England and thought it would be nice to take a canoe up the Thames to see scenery and so forth. I consulted a map and figured that sixty miles or so from London the Thames would go dry or nearly so, and that sixty miles would be plenty anyway. So I budgeted my time, money and muscular effort accordingly.

Very soon indeed I discovered that the Thames is only prevented from running away entirely by a series of locks, scattered along its length at an average of every nautical mile. I spent most of my time and all of my money getting in and out of locks, so that I finally went broke at Wallingford and had to be rescued by mail.

Earthward communications—in this country, at least—are now nearly delivered from such hindrances to swift and comfortable travel. Prohibition has done away with the delightful custom and ceremony of the opening of the bar on transcontinental trains as they emerged from dry territory into damper climates. Except for an occasional quarantine on some obnoxious insect, there is very little to tell the traveler by road when he skips over a state line into another sovereign commonwealth. The roads run from one end of the country to the other without let or hindrance, except for seventeen detours and ten thousand invitations to "Stop at Bill's Place." Which is as it should be.

So it is somewhat startling to discover that the swiftest and most independent of all conveyances and communications is still struggling against a lot of invisible barriers which seriously cramp its style and delay its complete usefulness. The airplane, which is supposed to be triumphantly free of all frontiers and limitations, is suffering seriously from a cobweb confusion of rules and regulations which are as uniform and logically consistent as a patchwork quilt. The pilot on a free course who contemplates coming down must worry not only over the possibility of breaking his undercarriage, but also over the probability of breaking local ordinances, state laws and a variety of Federal regulations. If he overlooks an international boundary he may discover that he has offended the League of Nations, insulted the World Court and seriously imperiled the peace of the peoples of the earth.

I vaguely remember Victor Dallin's legend of landing in Canada somewhere else than at a port of entry and finding it quite impossible to convince the authorities that he was there. It was written in the regulations that a foreign aircraft could not land where he had landed, and therefore he had not landed. I notice in the newspapers that not long ago Major Edwin Aldrin of Standard Oil narrowly escaped from landing in Chicago after a flight from Canada. If he had done so he might have been fined $600, but he accidentally arrived in Detroit, which is considered a respectable port of entry for ships from across the border. And if I remember rightly, there was considerable fuss when the *Graf* first came to America because some of her passengers had overlooked their proper landing papers.

These incidents would be only amusing if they did not multiply dangerously with every widening of the airplane's range. How anybody with the least trace of innocence or absent-mindedness gets around in Europe by air I can't imagine. I know by testimony of suffering friends that it is perfectly possible to get to Paris by air and discover that you have no business there because somebody has omitted to dot an "i" on your papers, after which you may wear out your shoes and patience trying to get things fixed. And the problem grows bigger and bigger as it takes in more territory. It would be perfectly possible for a free and easy pilot to get himself and his plane shot into an unfortunate casualty by flying over forbidden territory in Central Europe. England has had quite a lot of trouble routing her airways to India and elsewhere without offending the sensibilities of sundry people and nations on the earth below. Dirigibles must step carefully around the sky on the European frontiers or else the diplomats, ambassadors, military experts and lawmakers of three or four nations begin to mill around like a lot of frightened chickens. And a 'round-the-world passport for air travel looks like a collection of autographs and oversized postage stamps and is liable at any time to curl up and leave the passenger in jail. (*Continued on page* 194)

SOME PERTINENT COMMENTS ON THE SUBJECT OF AERONAUTICAL EDUCATION

By Archibald Black

President, Black and Bigelow, Inc., Engineers

EDUCATION in aeronautical engineering as a specialized subject has already found its way into the curricula of several of our colleges. In some, it forms the subject of a post-graduate course open to those who have already covered the subjects of mechanical, electrical or civil engineering. In others it is arranged as an option in the final year of the mechanical or civil engineering course. The syllabi of several aeronautical schools show rather surprising differences in the subjects included in these courses or options. Generally, there is a pronounced tendency to adhere far too closely to aerodynamics at the expense of other subjects of at least equal, if not greater, importance.

In a large measure this may be the result, not of bad planning of the course, but of failure to keep abreast with development in the industry. When aeronautical courses were first attempted by schools of college grade and otherwise, there were only two subjects of major consequence—aerodynamics and airplane structures. The original aeronautical engineering courses were, quite properly, limited to these subjects just as the first all aeronautical engineers were aircraft designers. As the industry developed, airplane designing became specialized to such an extent that, in making additions to the staff, producers employed an airplane structural engineer, an aerodynamicist, or an engineer specializing in design layout, rather than merely a single aeronautical engineer. A similar condition developed in the airship field, although much less noticeably because of the smaller number of airship design staffs in existence.

Following this creation of aircraft design staffs and with the advent of commercial aviation, the need developed for operations engineers, airport designers, airway lighting engineers and an extended list of specialists. These branches, it should be noted, are not all mere subdivisions of aeronautical engineering—some are distinctly separate fields calling for entirely different technical training. The graduate in "aeronautical engineering" leaving the average college may know little or nothing about the economics of aircraft operation or the problems involved in keeping fleets in daily service. Yet these are the problems that he must face if he is to fill a position as an operations engineer. Similarly, the same graduate may know nothing about the problems involved in airport design, excepting as these are affected by what he has learned of airplane performance. Yet, if he becomes an airport engineer, in his daily work he will be called upon for knowledge of soil drainage, turf development, building design and construction, not to mention such special problems as airport layout, provision for traffic handling, and lighting.

The foregoing comments were inspired by some thought given to this general problem of aeronautical education when I was recently requested to suggest a specific list of subjects to be taken up in some thirty to sixty sessions, which group would form an aeronautical option for the civil and mechanical courses of an Eastern college. The first and most natural impulse was to obtain the complete catalogues of the leading aeronautical colleges. This was done, but the accumulation of booklets was studied with considerable disappointment. It seemed that the faculty of the average school is carrying on with the mistaken idea that all of its students will become airplane designers when they graduate. As a matter of fact, the industry today probably has far more airplane designers than its needs of the moment require, but is very short of engineers with well-rounded knowledge of airplane operation problems or of airport design and construction.

It might be well at this point to call attention again to the now demonstrated fact that the aviation industry is primarily one of transportation, that manufacturing transport aircraft is an activity incidental to that of operating them and that the manufacture of military craft will continue to recede in *relative* importance as a result of the steady growth of transport and other operating phases. Just where the manufacture of airplanes for personal use will figure is still impossible to determine; at present, it is still of secondary importance. In the meantime, it is beyond argument that the transportation phase of the industry has only started and is destined to grow until it approaches the status of maritime or rail transport. The accompanying diagram, which represents an effort to create a picture of the entire aircraft industry in all of its branches, serves to show the variety of opportunities open to the engineer graduating from one of our aeronautical schools. It is readily apparent that only a limited proportion of these openings will call for training in airplane design. Yet, many of our colleges covering this field confine their scope to the subjects applying mainly to that particular branch of work.

It seems to me that we have already reached the stage wherein all of these schools could well afford to create some semblance of subdivision in their aeronautical courses. Thus, the student selecting this industry might take, let us say,

(*Continued on page* 166)

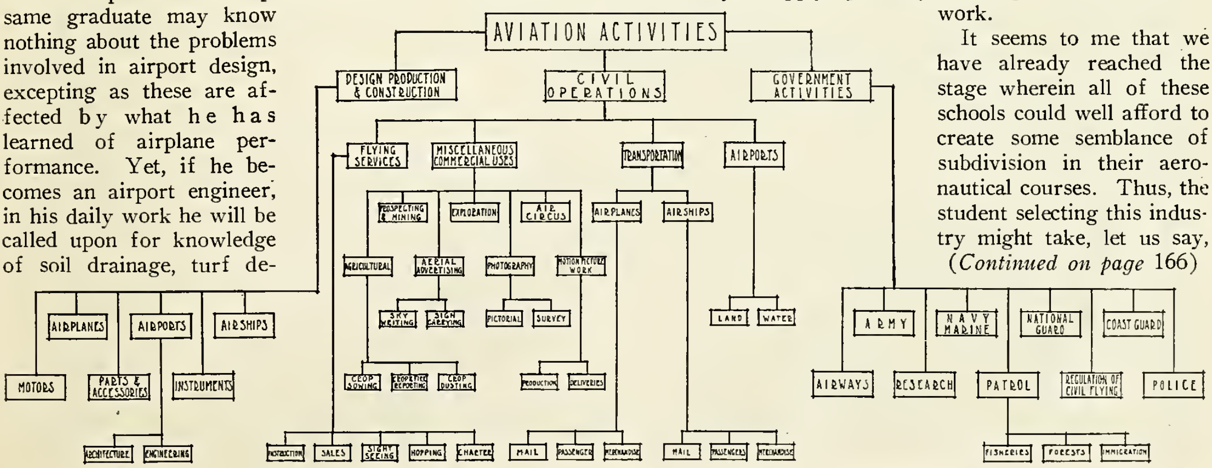


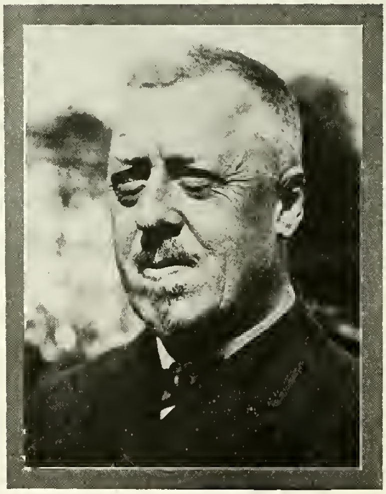
Diagram of the various divisions, subdivisions and branches of aviation activities

ECKENER—PUBLICIST, NAVIGATOR

By Lauren D. Lyman

THE two boys who gave man wings were bicycle makers and publishers of a weekly newspaper, publicists. The boy who was to do more than any other individual, save Count Zeppelin, perhaps, to give the world the airship was also a publicist and an amateur meteorologist. We are accustomed today to look upon Dr. Hugo Eckener as a proper example of the German engineer-entrepreneur, a devotee of the dirigible trained in the Zeppelin school at Friedrichshafen, and by reason of seniority perhaps the leader of that group of able airship captains developed on the shores of Lake Constance during the World War.

Dr. Eckener has never emphasized, to the public at least, the fact that he started out in life to be a journalist, a writer of editorials with a distinct leaning toward political economy, a man of the phrase rather than a man of action, an observer of life rather than a doer. But his definite ability to get the most meaning into a sentence betrays his training and is a valuable quality in his campaign to sell lighter-than-air to the world. The conception of the world cruise and the visit on the one voyage to South and North America came from a mind trained to tickle the public fancy. Of course this "public relations" ability would have been useless save for the distinct achievement that has always accompanied its use, and Eckener doubtless was the first to realize that fact.


Dr. Hugo Eckener

When the *Graf* barely escaped disaster on its first voyage, Eckener did not attempt to hide the news from the public. Rather, he capitalized it as a proof that, come what might, the airship could muddle through safely. The story is an epic of the sea and air, and Dr. Eckener added to its drama by sending his son, Knut, aloft on the naked girders in charge of the handful of brave men who made temporary repairs. They climbed out on that swinging fin over the open ocean, sewed together the torn fragments of fabric, and saved their ship as she tossed fifty and a hundred yards up and down, helpless before the winds.

Again, on the return voyage, when the *Graf* headed into a storm off Newfoundland, Dr. Eckener told the story of the dangerous minutes. And the dangers were not lessened in his telling—nor were they exaggerated. He merely told dramatically how the *Graf* rolled and tossed and ended his story with the statement that the *Graf Zeppelin* was already "antiquated and too small for the work she had to do."

It is a long way from the boy Eckener scanning the skies above the rough waters of the Baltic near his birthplace in the north, so close to the Danish border that the German airship captain might well have been a Dane, to the head of the Luftschiffbau Zeppelin and the skipper of the greatest airship in actual service. In those days his greatest pleasure was to take a small boat and go out and do battle against the elements. He studied cloud formations and winds, and studied them methodically and scientifically. He gathered all the lore of the old sailors along the beach, and translated weather signs and legends into scientific meteorology, until he came to recognize signs that even the veterans failed to see. Indeed, the story is told of how veteran fishermen were wont to ask young Eckener about the weather before they put to sea in their cockleshells. He became that rare thing, a prophet with honor in his own country. It was then that he obtained the rudiments of the meteorological education that has meant so much to him as a transoceanic navigator.

But Eckener was still a long distance from aeronautics. This was fifty years ago. He went to school, the gymnasium that is the foundation of German education, and then the technical high school and the university. He became a writer on political economy, with special reference to current topics. His quick mind and ready pen and great energy soon made a place for him in the world of publications and controversy, especially the latter. Eckener, the journalist, took sides. He was not one of the "on the one hand" and "however, nevertheless" editorial writers who always play safe. It was this attribute, curiously enough, which opened the door for him in the Zeppelin world. Several versions of the story are accepted in Germany, all alike in essentials. Dr. Eckener, it is told, moved with his family to Friedrichshafen for the sake of the mild climate. This was about thirty years ago, perhaps a little more. There he came into contact with the long panetela-shaped airships on which Count Zeppelin spent his fortune in experimentation. The question of the use of public funds in support of the Count's invention was being agitated, and Eckener the writer had something to say on the subject. He was against it, and he said so in writing, and vehemently. He proved that these ships would never be economic factors of importance commensurate with their expense.

The articles, or their effect at least, got back to the Count. Also the news that the enemy was almost within the fold and so the Count acted with characteristic directness.

One evening, legend relates, the young economist had a visitor who introduced himself as Count Zeppelin. It developed in the first conversation that both Zeppelin and Eckener were chess players, and with this mutual hobby the two men fell to the task of getting better acquainted. They took each other's pawns and listened to each other's arguments. Other evenings followed, with the Count pressing his attack on Eckener's opinions with greater vigor than his attack on Eckener's king. Finally, after something of a campaign Eckener showed signs of weakening, and Count Zeppelin suggested that he take a ride in one of these airships. Eckener agreed, and right there the battle was won. He not only ceased his attacks on the airship and Graf Zeppelin, but brought his able pen to the aid of the Count. Soon that did not satisfy him, and he informed Graf Zeppelin over one of their numberless chess games that he would like very much to enter the service of Lufftschiffbau Zeppelin as it was then organized. Ap-

parently there was little for him to do for the Count in those pre-press agent days, but he found a way to use Eckener, for it was about this time that the knowledge of weather acquired by the boy fisherman of the Baltic brought his practical and scientific value to the fore. The young journalist made many flights and, when in the air, paid particular attention to cloud formations and the weather conditions as they appeared around him.

Frequently he would suggest to the skipper that a certain condition ahead might be avoided by a slight deviation of course and that another condition was not as serious as it appeared to be. On one of these occasions, when Eckener had been perhaps more than usually active with his "back seat driving," the captain of the airship turned on his adviser and suggested that he take over the craft. Eckener, from being an observer, found himself in command. It is reported that he brought the ship through its course competently and from that time on took a more and more active part in navigating Zeppelins, with the result that the World War found him in the position of chief instructor for the Zeppelin company. How many airship captains and crews he trained is not recorded, but the Zeppelin works were for a time turning out airships at the rate of several a month and they were all manned and placed in service.

Following the war and the resultant quietus placed on airship development in Germany, Dr. Eckener's place was not altogether enviable. Primarily an active man, he had, for a time at least, been deprived of his chief activity. Here again is something of a hiatus in his career. We know that he was planning for the day that appears to be at hand, when the Zeppelins would take their place with the ocean liners in cutting time and distance between Germany and the world markets in other continents and hemispheres.

It was Eckener who planned the *Graf Zeppelin* at that time, the largest airship yet built, which would have been even larger except that the dock at Friedrichshafen was too small.

"And we in Germany were too poor to build a larger dock," Dr. Eckener explains, "so we did the best we could with what we had."

What of the future?

Dr. Eckener answers that question not as an enthusiast pressing his hobby, but as a scientist with a theory moving slowly and surely along an unexplored path.

"We must study every phase of the problem before acting, before committing ourselves," says Eckener. "For example, we must find out by the use of the *Graf* if the public is ready for airship travel and (he was speaking at the close of the world cruise) this I think we can consider proved. We must, by using the *Graf* to the best advantage, ascertain the costs of operating an airship and the best routes to fly, both from the standpoint of operations and traffic."

Then he is off again on what is his pet branch of his art, using even the worst weather to help his craft travel. On the southern routes between the Western Hemisphere and the Eastern, the pilots and skippers of the whalers and clippers of those romantic days a hundred years ago found a steady, dependable eastern trade wind. Steam followed the sail and is still taking advantage of this eastern trade wind. The trans-oceanic fliers from east to west who have achieved their objectives have ridden this wind either from the Pillars of Hercules or the coast of Senegal straight across to Natal and Pernambuco.

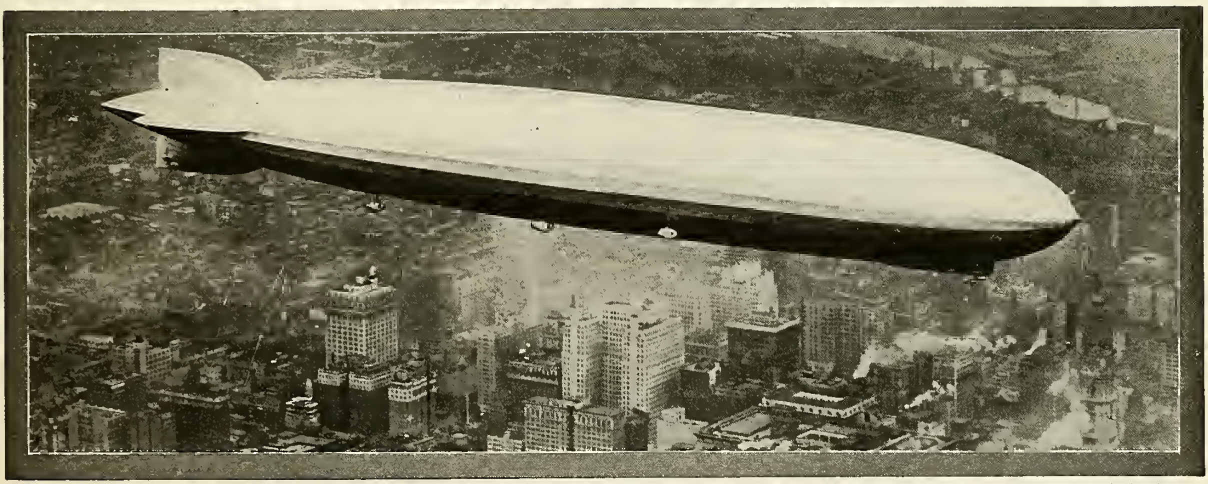
Coste and LeBrix, Ferrarin and Del Prete and the great De Pinedo, riding these same favoring winds, discovered something more or less unknown to the navigators of surface craft. As they climbed to about the 2,000-foot altitude, the easterly winds diminished to almost a flat calm. It was near the surface of the water that the greatest help was found. Conversely, in flying from South America to Africa, it was aloft that the fliers sought a westerly wind.

Dr. Eckener was much interested in this phenomenon, and on his recent voyage from Seville to Pernambuco, he made a number of observations which he has not yet made public.

"If by regulating our altitude we can find favoring winds at the same time in both directions," Dr Eckener says, "then we have discovered a trade route of the utmost importance to world commerce. One trip will not be enough to establish the truth or falsity of the theory, but it is certainly something we must find out."

The German airship navigator did not finish his research on his visit to South America. It was equally important in his sight to discover just how a big airship would weather the tropical storms, in the Caribbean area, for to his economist mind the trade route between North and South America was of the utmost importance.

The *Graf* met and conquered several extremely heavy rain storms and came through without a prohibitive expenditure in lift gas. But again the cautious Eckener says that more experiment and research is necessary before the decision is made to (*Continued on page* 182)



Wide World Photo

The Graf Zeppelin over Philadelphia, Pa., after completing its first flight across the North Atlantic

BELIEVE IT OR NOT of AERONAUTICS

By Ernest Jones

THERE are in the early history of aeronautics many facts which, because they are largely unknown or believed to be of recent origin, may prove surprising or even seem improbable when tabulated in print. It is appropriate, therefore, to list these historical paradoxes under the heading (with apologies to Ripley) "Believe it or not."

1214-1294—The *All-Metal* Airship was proposed by Roger Bacon, and in 1670 Lana devised a plurality of copper globes fastened together. The conclusions from the project of the engineer Meusnier in 1784 incorporated the necessity for hugeness and rigidity. After Monge's metal gas container experiments in 1843 came the big metal hulls of Schwarz in 1893 and 1897.

1500—The *Air Screw* antedates the marine screw, Leonardo da Vinci having experimented with air screws as early as this year. The air screw of the helicopter toy is also credited to the Chinese of an unknown date. The *Variable* screw was first designed by Wenham in 1872; further experiments were made by Dieuaide (1877).

1595—Faustus Veranzio described the *Parachute* and an illustration was published in 1678. In 1783 Sebastian Le Normand demonstrated the idea by dropping from the window of a house. Blanchard, two years later, applied it to the balloon. Garnerin, Cocking and others inaugurated parachute jumping as an exhibition feature. On March 1, 1912, Tony Janus and Bert Berry demonstrated its usefulness for airplanes. The first to be saved by parachute from an aircraft was Kuparento at Warsaw, July 24, 1804, from a balloon. The height record for the early days has been credited to Mrs. Romig, known as Miss Hazel Keyes, for a jump of two and a half miles at Bakers Beach, San Francisco. In the course of five years of jumping, she supported her invalid husband and schooled three children.

1686—Francesco Lana suggested the possibilities of *Aerial Bombardment* but concluded "God would never surely allow such a machine to be successful . . . no city would be proof against surprise," etc. In 1846 John Wise urged the American Government to utilize his plan for bombing Vera Cruz from a huge balloon, but his urging was in vain.

1783—The use of *Balloons in War* was proposed by Girond de Villette after his ascent with Rozier, October 17. In 1784 balloons were actually employed against the enemy for observation and later adopted by many countries. Kites were proposed by Wenham in 1866, forecasting the Cody system adopted in England in our own recollection. The helicopter for observation, held in the air by electrically driven screws, was demonstrated by model in 1887.

1785—*Mapping from the Air* was proposed by Thomas Baldwin, who made some experiments at Chester, England. In 1859 Nadar and Godard took photographs from their captive balloon during the battle of Solferino. In 1862 Captain Beaumont, in his paper on balloon reconnaissance in the American Civil War, urged the mosaic of today.

1793—*First Air Voyage* in the United States made by the French balloonist, Blanchard, at Philadelphia on January 9, in the presence of President George Washington.

1794—The *Panel Code* used in the late war was first employed at the battle of Fleurus. Communication to the ground was done by signals on the side of the balloon.

1809—Sir George Cayley suggested the *Elevator* of today's craft and discussed structures and the reduction of resistance by *Streamlining.*

1809—Sir George Cayley also argued the *Dihedral Angle* for lateral stability. Felix du Temple built a machine incorporating this idea in 1857, followed by D'Esterno (1864), Butler and Edwards (1867), de Louvrié (1868), Pénaud (1871), Pénaud and Gauchot (1876), Barnett (1877), Linfield (1878), Moy (1879), Tatin (1879), Brearey (1885), Bazin (1888), Pilcher (1895), Maxim (1895), Lilienthal (1896), Langley (1891-1903) and on up through the years to the present.

1809—*Air Transport* as we see it was visualized by Sir George Cayley in *Nicholson's Journal.* "I feel perfectly confident . . . that this noble art will be soon brought home to man's general convenience and that we shall be able to transport ourselves and families, and their goods and chattels, more securely by air than by water, and with a velocity of from twenty to a hundred miles per hour."

1810—Thomas Walker suggested the *Rudder,* universally mounted, for steering and some method of maintaining the craft in equilibrium.

1812—The forerunner of the present *Great Airships* was that of Leppig, built at the expense of the Russian state. Scores of other attempts preceded and followed. Of the latter the principal ones were: Lennox (1834), Eubriot (1839), Jullien (1850), Petin (1850), Giffard (1852-1855), Andrews (1849, 1863-1866), Haenlein (1870), De Lome (1870), Haenlein (1873), Spiess (1873), Tissandier (1883), Renard and Krebs (1884), Wolf (1885), Severo (1894), Woelfert (1897), Schwarz (1893-1897), the long series of Santos Dumont (1898-1903), and Count Zeppelin whose series began in 1900.

1821—The newly discovered *Coal Gas* was first used for ballooning by Charles Green on July 19. This discovery gave ballooning its greatest impetus. Green was subsequently given a medal for his invention of the *Guide Rope.*

1831—*Air Mail and Commerce* foreseen by Thomas Walker in the second edition of his work. In 1870-71 air mail service by balloon was operated out of besieged Paris. At Mineola in 1911, Earle Ovington operated for one week the first demonstration of regular mail by airplane.

1840—Charles Green proposed to *Cross the Atlantic by Air.* The scheme was revived by Wise in 1843, by Lowe in 1859 and Donaldson actually started in 1873. Walter Wellman left Atlantic City on October 15, 1910, but discontinued the trip when technical troubles were encountered. The first non-stop ocean crossing was actually made June 14, 1919, by Alcock and Brown. The United States Navy's NC-4 concluded its flight in stages on May 31, the same year.

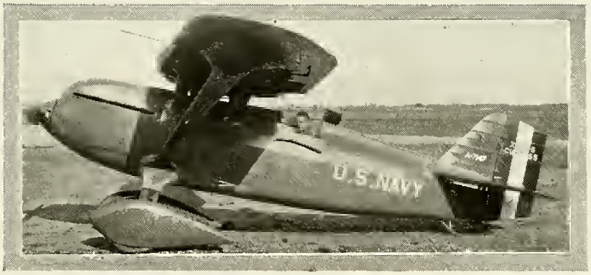
1842—Though suggested by Cayley in 1809, the Henson patent of 1842 showed a *Steam Airplane* employing all the general elements of those suggested at the present time. Henson and Stringfellow built in 1845 a large-sized steam model which endured many trials. The latter built a second in 1868. Smythies patented a steam airplane in 1860, and in 1865 Ponton d'Amécourt constructed a steam model helicopter. Other steam models and machines were proposed or made by Temple (1857-1877), Kaufman (1867), Artingstall (1868), an optician of Leipzig (1871), Moy (1875), Villeneuve (1872), Dieuaide (1877), Forlanini (1878), Goupil (1883), Hollands (1885), Frost (1890), Jno. P. Holland (1890), Ader (1890, 1897), Tatin (1897), Langley (1896- (*Continued on page* 188)

THE AIR RACES AT CHICAGO

A Brief Review of the Program for the National Air Classic

THE 1930 National Air Races, being held at the Curtiss-Wright Reynolds Airport, Chicago, August 23-September 1, promise to attract more spectators and provide wider diversion for the general public and greater interest in the aviation industry than on any previous occasion in the ten years' history of this aeronautical racing classic. The final program, organized after months of preparation and effort to give as great a variety of events as possible, contains many innovations as to regulations and conduct of events, the handling of crowds and accommodation of pilots competing in the races.

Cash prizes totaling more than $100,000 will be awarded. More than fifty events are planned, including seven air derbies, two of which are open to women pilots only; speed contests open to civilian or military pilots in addition to free-for-all speed events, balloon bursting, parachute jumping and dead stick landing contests; speed and efficiency events and exhibition flying. In the 1930 National Air Races, more attention than ever before has been devoted to light airplanes and private flying. The race classifications extend from under forty horsepower to unlimited powerplants and include both single-engined and multi-engined aircraft. Sportsmen pilots' races open to planes with powerplants ranging from 350-cubic-inch displacement to 1,000-cubic-inch have been provided.



Special high-speed Curtiss Sea Hawk to be flown by Captain Page in the free-for-all for the Thompson Trophy

Not the least of the problems in the management of the National Air Races is the accommodation of the thousands attending as spectators. It is expected that more than 1,000 airplanes will fly to the races, bringing from 3,000 to 4,000 passengers. In addition to providing facilities for repair, inspection and refueling that may be required by these planes, the first comprehensive sky traffic control plan to handle a great number of planes arriving and departing at a single field has been organized. The main feature of this plain is, briefly, the control of aircraft not competing in the races by means of lights on the field. These planes will be permitted to land and take off at the field during a ten-minute period every half hour. The air above and 1,000 feet on all sides will be restricted for racing and special events, except during this ten-minute interval. Upon landing, planes, pilots and passengers will be accommodated and receive "parking" checks.

The Curtiss-Wright-Reynolds Airport was leased from the Curtiss-Wright Airports Corporation for the period of the races. The field is northwest of Chicago, west of Evanston at Glencoe.

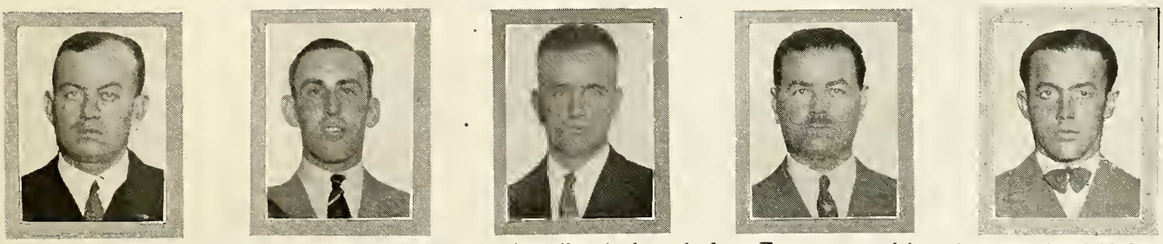
Indicative of the management's intention to interpret the races fully for the spectators, and to obtain the maximum of interest in the events as they are taking place, is the method in which the speed contests will be run off and that in which the various derbies will be finished. For the first time, race horse starts will be used, planes competing in the speed events being required to line up before the grandstand and start from scratch. These ships will be provided with markings which will identify them readily to the spectators. According to final plans, all speed contests will be held over a five-mile triangular course to keep the contestants within sight of the audience from start to finish. In the derbies, a control point will be established near the grandstand and the contestants will be presented to the audience in the order of finishing.

The five air derbies open to men only are as follows: non-stop derby from Los Angeles, California, to Chicago, for planes of any type or power, starting August 27; Men's Atlantic Air Derby for planes of approximately 200 horsepower, starting at Miami, Florida, August 20; Men's Atlantic Air Derby for planes of 100 horsepower, starting at Hartford, Connecticut, August 21; Men's Pacific Air Derby, starting at Seattle, Washington, August 21, prizes to be awarded for the highest figures of merit; and the Men's Air Derby for 100-horsepower planes, starting at Brownsville, Texas, August 19.

The derbies open to lady pilots are the Women's Pacific Derby and the Women's Dixie Derby. The Pacific derby, open to 200-horsepower planes, started at Long Beach, California, August 17 and ends at Chicago, August 25. The Dixie derby, open to planes of 100 horsepower, started at Washington, D. C., August 22.

In addition to the derbies, there are five events open to women pilots only; four speed races and a dead stick landing contest. Women may enter the free-for-all events.

This year for the first time the Thompson Trophy Race will be held and is included on the program of events at the National Air Races as the free-for-all speed race open to men. Prizes totaling $10,000 and the Thompson Trophy will be awarded the winner. (*Continued on page* 170)



Lieut. Alford J. Williams (center) and the prominent foreign pilots he brought from Europe to participate in the National Air Races at Chicago; (left to right) Loese, Germany; Atcherley, England; Williams; Doret, France; Columbo, Italy.

AIR—HOT AND OTHERWISE

A Separate Arm

By Frank A. Tichenor

NOW that the Naval Conference is dimming in the yesterdays, with all its bickerings, patriotics and sillinesses slowly vanishing out of public memory, it is time for these United States to think seriously about *real* national defense.

Nothing has ever demonstrated more clearly than the present situation that our existing governmental machinery is incompetent and archaic. Nothing has demonstrated more clearly that selfishness sometimes will creep in where only patriotism is supposed to dwell.

A revision of the national defense plan is necessary. It can be made as workable as the most efficient of American business institutions, which are the most workable in the world, and it must be workable if this country is to retain its safety.

Air is essentially a major arm of the services. Congress has not admitted it; heaven knows the Navy and the Army have not done so; but flying, itself, has decreed it. It must be recognized that the Navy and the Army must take subordinate places in a general and enlarged scheme of national defense which really would *Defend*. All nations, if they have any wit, are progressive when fighting for their lives. The United States must stand instantly ready to be characteristically progressive when grim clouds of war begin to gather, as they periodically have gathered, since humanity began, over every prosperous and fertile land.

We have been making many and wide-spread false motions, recently, in company with the other nations of the world. There was, for instance, that Naval Conference in London.

Readers of AERO DIGEST know that the Wright brothers doomed the battleship. But perhaps America's delegates to the solemn conclave, discussing the obsolete, did little harm except to waste the money of the taxpayers.

The air-minded must consider, understand and endorse the idea that no matter what is done with naval ships, whether or not they are scrapped as has-beens, some arrangement must be made whereby Air will be given at least an equal ranking with Water and with Land in our defense.

Air, at present, is a divided orphan family—Army has some of it—Navy has some of it. Yet the air arm is far more important to the nation than ships, marching men, cavalry, tanks, or mighty guns. It supplements and eventually will virtually supplant them all.

The conference was called with the pretense by those empowered to run it (and the belief of those compelled to pay for it) that it actually had naval disarmament for its object.

Now we know how anxious for it the boys in navy blue actually were. How could they favor disarmament? They make their livings and their reputations out of the creation and maintenance of a great fleet. So it is not quite natural that they should wish forthwith to abolish fighting ships by international treaty. As natural as sunstroke in December.

It is necessary to consider naval matters and the Naval Conference, which as it dims in memory becomes an historic chapter so pathetic that it will move posterity to tears. If they be tears of laughter, that will only prove posterity to have a better sense of humor, and of values, than our own generation seems to have. Even those of us who see the joke can't laugh at it.

Some details of that Naval Conference will probably not be mentioned, however, when history is written.

The foremost naval authorities of each of the three countries, England, the United States and Japan, did everything they could to offset every effort in favor of arms limitation (the object of the conference) made by the representatives of the people who do not wear naval uniforms. But they knew that if they came out frankly against limitation of ships they would defeat their cause. Consequently, they tried other means, attacking every detail of agreement as it arrived, hoping to start quarrels which would break up the meeting. Its predecessor, also held in London, had been broken up in that manner, each naval expert using technical terms, puzzling and ominous to the layman, to prove that every reasonable proposal which showed promise of adoption, actually, through some word-detail of the document, gave another nation paramount advantage over that which the objecting technical expert represented.

In America the Navy was wholly responsible for American opposition to the naval treaty, backed though it was by the President and the people, and stood behind the opposition offered by the Navy League, the retired officers who suddenly turned authors for the occasion, the bitterly fighting pro-Navy Senators.

Any detail of naval limitation must mean fewer jobs for naval people and less chance of war, the latter being the sole cause for the existence of every naval officer on earth and its seven seas. That now laughable quibble about secret correspondence was a naval ruse, designed to stir up anger and suspicious enmity.

Really important and independent newspapers throughout the world saw through the situation easily. In Tokio the press deliberately attacked the Japanese naval group, urging its government to ignore selfish arguments and consider only the interests of the people, which it said plainly constitute quite another matter. There seemed to be more clear thinking and real courage in Japanese than in some American editorial rooms.

All the naval "experts" and their legislative sympathizers, everywhere, sang similarly sad, sweet songs. On July 12, when Senator Hale referred to the inevitability of American war with Japan, he made a speech which, had the word "America" been substituted in it for the word "Japan," and had it been delivered in the bamboo language, might have served any pro-naval Japanese spouting against the treaty quite as well as did those which several Japanese Big Naval Men actually composed and voiced for the fascination of the people of the Kingdom of the Rising Sun.

Admiral Bridgeman of Britain, Admiral Kato of Japan and all the members of the General Board, U. S. N., like well-trained parrots, cried in close harmony, "Polly wants a lot of warships." The sound rose up to the sky from London and vibrated around the world. The naval men of all the world say "Gimme" in exactly the same language. And they say it all the time.

The American General Board was worried pink, though. For the first time in their history these ornamental sailors found themselves confronted by a real business man in the White House—Hoover!

They started out to wreck the treaty, gaily and deliberately. They retreated from (*Continued on page* 170)

EDITORIALS

MORE ABOUT PROGRAMS

THE New York *Herald-Tribune* expresses a justified satisfaction in the prospect that the five-year program will give our naval aviation 1,000 planes by 1931, even though appropriations were not forthcoming during the first year of authorization—1926. At the close of the fiscal year of 1930 the Navy had 928 useful planes and 267 on order.

"But," says the *Herald-Tribune* (and we heartily agree), "1,000 naval planes is not a large number for a country like ours."

Evidently the *Tribune* writer appreciates—though not more fully than the facts warrant—the use which the Navy has made of the planes with which it has been provided, for he continues—"The art of naval aviation has made such strides that to many persons the flying done from the aircraft carriers, *Lexington* and *Saratoga,* is as fine an example of coördination between man and machine as our age affords.

"Under the terms of the London Treaty (which has recently been ratified) we are allowed to put all our six-inch-gun tonnage into aircraft carriers. There is much to be said for doing this, and there is everything to be said for starting work on the 10,000-ton carrier for which appropriations have already been granted."

It is gratifying to find such intelligent words in the *Herald-Tribune,* which comes as near to being the Navy administration's organ as any other newspaper. It is a sign that its editors are becoming logically air-minded. Voters, also, are evincing an increasingly appreciative interest in naval aviation.

WORLD'S BIGGEST AIRLINE

ON September 15th, Pan American Airways becomes the largest airline. The purchase of the assets of NYRBA by Panair means that the new line, flying the largest fleet of commercial airplanes in the world, will cover more than one hundred thousand miles every week in every Central American and South American country.

In less than twenty months this American project has surpassed the operations of any other country; a noteworthy accomplishment in binding the Americas with American-operated lines.

BOLSHEVISM AND THE N.A.A.

THE Russian equivalent of our National Aeronautic Association, despite its name of Osoviakim, has three and one-half million enthusiastic members. Recently the Osoviakim was publicly thanked by General Oborevich for the practical expression of its earnestness in having given to the Russian nation no less than fifty-one airplanes. These have been presented to the Soviet army "as a defense against the war danger"! The Reds evidently think that working planes are better for their purpose than talking naval conferences.

If the Russian N.A.A. can do this, who knows what the American N.A.A. can do? It certainly has done nothing so far. Possibly the N.A.A. may need a little Bolshevism in its veins. Bolshevism is at least a vital force.

CHANCE VOUGHT

THE death of Chance Vought was a great blow to American commercial aviation, and a real loss in other ways to this nation. His was a character embodying the ability to fight, yet combining that sentiment which creates and cements strong friendships.

To those of us who knew, loved and respected him it seems tragic that the end should have come before he could really enjoy the well-earned fruits of his tremendous, untiring and ever intelligent labors.

Long ago he had won distinction, although he was only forty years old. Beginning his flying career in 1911, he won his International Pilot's License a year later. As a designer and manufacturer he filled a place which the United States will find it extremely difficult to fill again. At least twenty successful types of flying craft were designed by this remarkable young man, among them the well-known Vought Corsair, used by the navies of the United States and other countries.

Aviation engineering has lost a genius, aviation manufacturing has lost an able and conspicuously successful business man, and his many friends have lost a wonderful companionship.

THE AIR MAIL SITUATION

CONGRESS has adjourned and the air mail operators have spent their anticipated profits for 1930 in Washington's high-priced hotels waiting for the Postmaster General to act under the authority given him by the Watres Act. And still, as we go to press, the certificates have not been awarded.

The Watres Act made Walter F. Brown czar of the air mail, with almost as much power in his field as the late potentate of Russia had in his. Brown may have his reasons for slow motion, but inasmuch as he said in his address to the operators in early spring that the reason for canceling old contracts was "economy," we fail to understand how he can feel justified in a procedure which is as expensive as it is deliberate. For of course until the new certificates are handed 'round, the old rates (which he said were far too high) must continue in effect.

Nor do we appreciate how aviation can be promoted by restricting the bidders for contracts to a few companies and thus confining the bidding for the manufacture of mail planes to just that few. We doubt if the authors of the law intended to give the Postmaster General power to select those companies which might bid on these contracts, and we also doubt the strict legality of his actually doing so.

We have carefully watched all air mail operations both under Mr. Brown and under his predecessor, Harry New. At an early date we shall present an interesting story of these various transactions—a story which will enlighten and surprise a lot of taxpayers.

A SURVEY OF CIVIL AVIATION IN THE SOUTHWEST—Part 2: Airports, Manufacturers, Etc.

By George Svehla

A MAJORITY of the important airports in the Southwest are either owned or operated by municipalities. The major airports of Arizona are the following:

The airport at Ajo is a municipal field designated by the Federal Government as a temporary "port of entry" from Mexico.

Douglas International Airport, containing 650 acres, is located two and one-half miles east of Douglas. A municipal field owned by Cochise County and operated by a chamber of commerce committee, it is well lighted and adjoins the landing field of Agua Priete on the other side of the borderline. It is used by Union Airways and Standard Airlines (W. A. E.).

The Nogales airport is a commercial field also designated as a "port of entry." It contains 160 acres owned by Santa Cruz County, is operated by the chamber of commerce, and is a terminus for Union Airways.

Phoenix has two airports. Sky Harbor is a 280-acre commercial field owned by Union Airways and located two and one-half miles east of the city. The field is well equipped and lighted. The municipal port, which is six miles to the northwest, contains 360 acres, but has rather poor facilities. Sky Harbor is used by Apache Airlines, Inc., and Standard Airlines (W. A. E.).

Tucson also has two airports. Mayse Field, a commercial port, lies four miles south and is eighty acres in size. Davis Monthan, municipal airport, is owned by the city and operated jointly with the Army Air Corps. The field is well lighted, provides hangar space and service and is being used by Union Airways and Standard Airlines.

Winslow's airport is qualified for an A-1 rating, being a muni-commercial field. It is used by Union Airways and is a stop on the T. A. T.-Maddux route.

Holbrook, in the Painted Desert, is a stop on the Western Air Express route, and a port for Union Airways.

Globe-Miami's joint air-field, known as Midland Airport, is located midway between the two towns, and is the only airport in that mountainous region. It is owned by the citizens of the two municipalities, together with the copper companies operating in Globe and Miami. The airport is the headquarters of the Apache Airlines, Inc.

Kingman has a commercial field owned and operated by T. A. T.-Maddux. It is a stop on the transcontinental route.

Airports in New Mexico are very few. Albuquerque, however, has one of the most important airports in the Southwest. A commercial field, which is the one most used, contains 480 acres, drained and graded, with marked runways, lighting for night flying, hangar space, hotel and restaurant. The field is used as a stop by T. A. T.-Maddux, which has leased part, and by Western Air Express. Western Air Express's new hangar at the field cost $65,000.

Clovis has a commercial field operated by T. A. T.-Maddux as a train-plane junction point.

Roswell recently dedicated a new municipal airport. A commercial field lies thirty-one miles to the north.

Other towns with landing fields are Las Vegas, Raton, Santa Fe, Carlsbad Caverns (used by Scenic Airways).

The major airports of Oklahoma, principally municipal, are employed by most of the airlines in the Southwest.

Duncan municipal airport, which lies one mile south of town, is used by S. A. T. The field consists of eighty acres laid out in an "L" and is operated by the Duncan Air Service.

Oklahoma City has a municipal airport of 120 acres located four and one-half miles southwest of the city. It is used by N.A.T., S.A.T., S.A.F.E., and others. It is a first-class airport in all respects.

Ponca City has a commercial field which is used by N.A.A. and S.A.T. It is situated two miles to the southwest of town. There is also an emergency field nearby.

Tulsa's municipal field is four miles east of the city, and is used by N.A.T., S.A.T. and S.A.F.E. This airport, which is exceptionally well equipped, has, during the past few months, been enjoying a heavier passenger traffic than any other air terminal in the world. There are also three commercial fields in the vicinity.

Waynoka has a commercial field operated by T.A.T.

Other municipal and commercial fields of lesser importance are at Bristow, Seminole, Wewoka, Woodward, Miami, Norman and Shawnee.


Hangar, administration building and fuel station at Abilene airport as seen from air

In Texas the following are considered to be of the most importance:

Abilene's 180-acre municipal airport is used by both S.A.T. and S.A.F.E. It lies three miles east of the town and is operated by the West Texas Air Transport Corporation.

Amarillo has a commercial field operated by Aircraft Holdings, Inc., operators of the Albuquerque airport. The town is a stop on the Western Air Los Angeles-Kansas City route.

Austin, the capital city, has a municipal airport used by N.A.T. and S.A.T. Another field, called University Airport, is operated by the local distributor of Waco planes.

Beaumont has a fifty-five acre municipal field one and one-half miles

Station and restaurant of T.A.T.-Maddux Lines at Albuquerque

west of town. It is used by Southern Air Transport's air mail division.

Big Spring has an excellent municipal field used by S.A.T. Flying Service.

Brownsville has a municipal field under lease to Pan American Airways. The airport, which is a port of entry from Mexico, is also used by Southern Air Transport.

Corpus Christi has a municipal field three miles southwest of town used by the S.A.T. passenger line between San Antonio and Brownsville.

Dallas's 163-acre municipal airport (Love Field) is a million-dollar airport six miles northwest of the city. It is used by N.A.T., S.A.T., S.A.F.E. and others. Hensley Field, twelve miles from the city, is used by the Army.

Fort Worth (Meacham Field), the home port for Southern Air Transport, is also used by S.A.F.E., N.A.T. and others. The airport contains 175 acres.

The field at Breckenridge is used by Southern Air Transport System.

El Paso has a 200-acre municipal field six miles west of the city which is used by S.A.T. Flying Service and Standard Airlines (W.A.E.). Biggs Field, three miles northwest, is used by the Army, as is Fort Bliss Field. There is also a commercial field of fifty acres three miles northwest.

Galveston has a commercial field two miles west of that city used by S.A.T. Flying Service. It also has an Army field.

Houston has a 193-acre airport nine and one-half miles southeast used by S.A.T. It is a terminus for two air mail lines, and five commercial companies operate from the field.

Laredo has one commercial field and an Army field five miles northeast.

Midland has a good municipal airport of 160 acres which is privately operated. This air-field is located six and one-half miles west of the city. It is used by S.A.T.

Pampa has a municipal airport used by Braniff Airlines (S.A.T.). A school is also situated there.

Port Arthur has a commercial field lying three miles northwest of town which is operated by The Texas Company.

Ranger has a municipal airport of 130 acres.

San Angelo has a good municipal field five miles from the city which is used by S.A.T.

San Antonio has several Army training fields and a new 200-acre municipal airport. Mail and passenger and express services are operated from here by Southern Air Transport, and schools conducted by Southern Airways, Inc., San Antonio Aviation School and Mission Air Service.

Sweetwater's municipal airport, located three miles west of town, is used by S.A.T. and S.A.F.E. as western terminal and junction point with Texas and Pacific Railway.

Vernon has a first-class municipal field five miles south of town.

Waco's airport is used for S.A.T. mail and passenger service.

Wichita Falls has a 240-acre municipal airport five and one-half miles north of town. This field is used by Southern Air Transport. There is also a 480-acre commercial field two and one-half miles southwest.

Aviation Schools in the Southwest

The Southwest has always been prominent in the field of flight training and ground instruction. The mention of San Antonio immediately brings to mind those famous fields, Kelly and Brooks, where so much of American military aviation history has been made. In addition to these fields, the Army maintains numerous other fields in Texas, several in Oklahoma and Arizona, and a few in New Mexico.

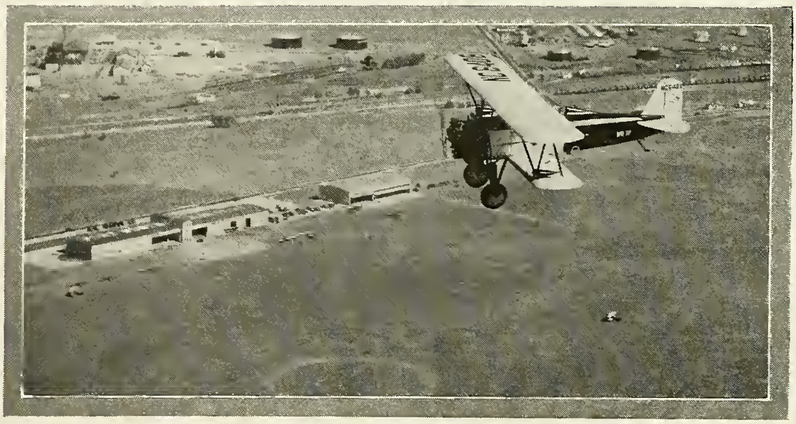
Among the most important commercial schools in the Southwest are the Dallas Aviation School, the Spartan School of Aeronautics at Tulsa, and the Curtiss-Wright schools located at strategic cities in the Southwest area.

The Dallas Aviation School claims to be the largest aviation school in the entire South. Organized seven years ago, it now has students from all parts of the United States. C. E. Harmon is general manager and R. L. Lowery is chief instructor. There are five flight and three ground instructors. Location is at Love Field, Dallas, Texas.

Courses offered are as follows: Private pilot, commercial and transport flying courses, each of which includes ground instruction; a master ground school and mechanic's course; special courses in flying various types of planes. The cost of instruction in the various courses varies from $100 for the simple ground course and $385 for the private pilot's course to $2,500 for the transport course.

Flying equipment consists of eleven ships, including Swallow, American Eagle, Eaglerock, Robin and Stinson planes. The school also sells a two-place ship powered with a Kinner motor, offering a 200-hour transport course, gas and oil, and hangar storage with each plane.

Dormitories are operated for students at a rate of about $3 per week. A cafe is located on the field. The Dallas Street Railway Company operates a bus service to the field on frequent schedules. The school pays the railroad fare to Dallas for students taking the commercial and



Stearman biplane flying over Fort Worth Airport

transport courses, and one-half the fare of those taking the private pilot's course.

The Spartan School of Aeronautics, located at Tulsa, Oklahoma, is one of the largest in the Southwest and among the best in the country. This school, which was incorporated in February, 1929, as an associate company of the Spartan Aircraft Company, has experienced a rapid development.

The school offers courses in welding, mechanics and private, limited commercial and transport flying. Prices range from $150 for the former two courses to $3,250 for the latter. The school has a teaching staff of eight experienced fliers. Norman G. Souther is business manager and Ellis M. Fagan, chief instructor.

Twenty planes, housed at the main hangars of the Spartan Aircraft Company at the Tulsa Municipal Airport, are used in flight instruction. Except for four planes of other manufacture, they are Spartan planes of open-cockpit and cabin type, and are equipped with radial air-cooled engines. Student flying is conducted from an auxiliary field several miles from the municipal airport. Shop courses are given at the plant of the Spartan Aircraft Company.

The school operates dormitories and a lunch room for students and pilots, as well as a bus service into the center of Tulsa. Transport and limited commercial students are given free transportation to Tulsa over S.A.F.E. lines, and half-rate allowance is made to private pilots, mechanics and welding students.

Curtiss-Wright Flying Schools are operated by the Curtiss-Wright Flying Service division of the Curtiss-Wright Corporation. Curtiss-Wright schools in the Southwest are located at Dallas and Oklahoma City. The company maintains a cotton-dusting fleet at Houston.

Night view of the administration building at Phoenix Airport in Arizona

As in other parts of the country, Curtiss-Wright has its own airports in the Southwest. Its new airport at Dallas involved an expenditure of more than $250,000, the steel hangar alone representing a cost of $100,000.

At Oklahoma City, Curtiss-Wright has acquired a 160-acre airport at a cost of $80,000 on which has been erected a hangar at a cost of $90,000. Additional field equipment cost another $50,000.

Instruction and equipment is uniform at all Curtiss-Wright schools. Curtiss Fledgling planes are standard equipment for flight instruction. Other types are available for transport and commercial students. Cost ranges from $600 for the private pilot's course to $4,500 for a transport course. The schools carry public utility, life and accident insurance for students while in training and provide parachutes for every student.

Southern Airway School at San Antonio succeeded the Texas schools of the Southern Air Transport system when the latter withdrew from this field. Instruction is given in private, limited commercial, and transport flying. Equipment is standard.

Among the other schools in the Southwest is the Collier School of Aeronautics, located at Tulsa. The school is a division of Wilcox Aeronautics, Inc., and is directed by W. S. Collier. Standard equipment is used.

Southwest Air Service, Inc., of Tucson, Arizona, recently merged with Union Airways, Inc., offers courses in ground work and flying in addition to operating a taxi and sightseeing business.

Duncan Air Service, operator of the Duncan, Oklahoma, airport, has in the past offered courses in flying and ground work. I have been unable to ascertain its present activities.

Miami Aircraft Company, located at Miami, Oklahoma, is a small organization which formerly manufactured planes, giving flight instruction and ground work in addition. No information regarding its activities or existence has been forthcoming recently.

Southwest Airways, Inc., of Tulsa, includes flying and ground instruction among its wide-spread activities of taxi and sightseeing service, servicing and general repair.

University Aerial Service Company gives flying and ground training in addition to operating University Airport at Austin, Texas, giving taxi and sightseeing service, and doing servicing and general repairing.

International Flying Service located at Love Field, Dallas, Texas, gives flight and ground instruction in addition to taxi and sightseeing service.

Houston Airways, Inc., is Houston's pioneering aviation organization. It offers flight and ground instruction in addition to taxi and sightseeing service, and does considerable aerial surveying and mapping.

San Antonio Aviation and Motor School gives flight and ground instruction, and acts as supply house and jobber in aviation parts.

Instruction is also given by individuals operating flying services at the following places: Beaumont, Temple, El Paso, in Texas; at Guthrie, Muskogee, Okmulgee, in Oklahoma; at Yuma, Phoenix, Douglas, Prescott, in Arizona; at Albuquerque, Santa Fe, Las Vegas, New Mexico.

Aviation Activities of the Oil Companies

Oil producers and refiners in the Southwest have been extremely progressive in contributing to the development of aviation. Sponsoring numerous flights to prove their products after patient experiments and developments in the laboratory, Southwestern oil companies are today reaching out after national distribution of their aviation products. The following occupy the foreground in oil company aviation in the Southwest:

The Texas Company through its subsidiary, the Texas Pipe Line Company, was the first oil company to demonstrate the utility of the airplane in surveying for pipe line routes. In selecting a route for a pipe line from Monahans, in west Texas, to the Port Arthur refineries, a distance of 600 miles, the company chartered the Edgar Tobin Aerial Survey Company of San Antonio to make aerial surveys of the distance between Monahans and San Marcos, 250 miles of wild, mountainous country. The saving resulting from this aerial survey alone amounted to three months' time, and reduced material and construction costs more than $500,000.

The company at present (Continued on page 162)

THE ALL-AMERICA FLYING DERBY

THE All-America Flying Derby, longest air race ever held in this or any other country, passed into the annals of successful sporting events when ten of the eighteen pilots who had taken off on July 21 set their planes down once more on the municipal airport at Detroit, Michigan, after eleven days. The influence of the race upon the future design of airplanes and powerplant installation represents its principal significance.

Unique ideas of cowling, streamlining, landing gears, wing construction, motor installation and fuselage design, many no more than laboratory experiments before the race, were tried out under severe test, some to be discarded, others to earn a place among methods regarded as standard practice. Besides the ideas thus tested, the race gave birth to others as novel and as filled with promise of further improvement in the technique of airplane construction.

American Cirrus Engines, Inc., a unit of Allied Motor Industries, Inc., organized and sponsored the All-America Flying Derby to demonstrate the possibilities of long-distance flight by light airplanes. The course of 5,541 miles took the contestants from Detroit, south to Texas, west to California, and back to Detroit over the mountains and deserts of the South and Southwest. It presented all the difficulties of flying that may be found in the confines of the United States, yet ten of the eighteen planes that started completed the course on schedule and, strangely enough, six of the eight that were forced to withdraw did so over what may be termed the easier section of the route. Various difficulties contributed to these withdrawals: difficulties of landing and take-off accounted for several, a broken spark plug brought one man down in the desert, and a broken gasoline line accounted for another. Only in one instance was the withdrawal of a plane the result of motor trouble.

As evidence of the ability of light planes to attain a high sustained rate of speed, the race produced particularly surprising results. Lee Gehlbach, the winner, flying a specially built Command-Aire, averaged 145 miles per hour while in the air. On one lap, that from Detroit to Buffalo, he attained a speed of 200 miles per hour.

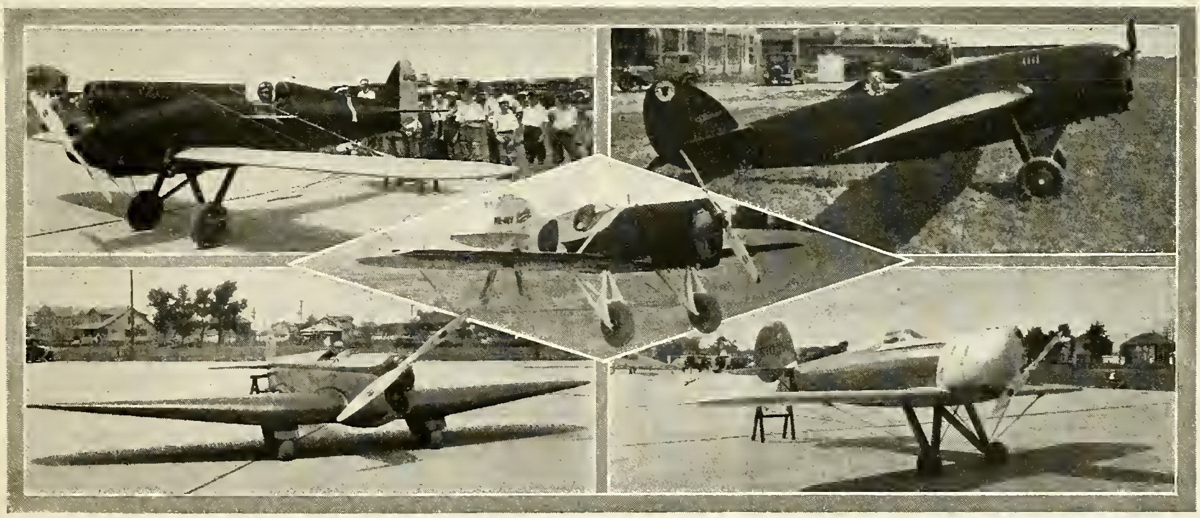
From another point of view, however, the behavior of the stock model planes in the race is probably of equal interest. Five of the ten planes to finish were stock models and, if they did not attain the speed of Gehlbach's "Little Rocket," they showed an amazing ability to continue flying from day to day with little or no trouble and with a minimum of attention to their engines.

When the race was first announced, inquiries were received from almost all the makers of light planes in the United States and more than twenty undertook to produce planes for entry. Various delays and accidents reduced this number until eighteen planes were on the starting line on July 21. Of these, seven were standard stock models, and an eighth might be included in this list since the plane is now to be put into commercial production. In fact several other planes may possibly be produced commercially as a result of their showing in the race.

The accompanying table lists the eighteen entries, the make of ship each pilot flew, the type of engine with which it was equipped, the gross weight of the ship, its wing area and loading, its average speed for the race, and the place in which it finished. (See next page.)

In addition to demonstrating the ability of light planes successfully to engage in long-distance cross-country flying, the race established the practicality and value of several construction forms for which only experimental evidence had been available heretofore. The lessons resulting from the race may be divided into those which apply chiefly to the engines and those which have to do with the plane construction itself. Eleven of the eighteen planes were equipped with supercharged engines and five of these were of the inverted type. There were two other inverted motors not supercharged, and ten planes had upright Cirrus engines of which five were supercharged.

The inverted engine, which had its first wide-spread use in this race, won the acclaim of all the pilots who flew it. It made possible the use of short exhaust lines running beneath the plane: the shortness of these lines reduced the back pressure on the engine and so added to the power; the position under the plane reduced the fire hazard and eliminated the nuisance of smoke and smell coming back upon



Some of the planes which competed in the All-America Flying Derby; (Upper left) Gehlbach, Command-Aire, the winner; (upper right) Stanton, Cessna; (center) Bayles, Granville Bros.; (lower left) Mummert, Mercury; (lower right) Smith, P.S. of E.

Results of the All-America Flying Derby and Specifications of the Competing Planes

Place	*Pilot*	*Airplane*	*No.*	*Engine* *	*Gross Load (Pounds)*	*Wing Area (Sq. Ft.)*	*Wing Loading (Lbs. per Sq. Ft.)*	*Average Speed (M. P. H.)*
First	Lee Gehlbach	Command-Aire	1	SC	1150	88	13.1	127:11
Third	C. W. Meyers	Great Lakes	3	E	1606	278	5.8	107:43
Sixth	Larry Brown	Calif. Cub	4	C	1570	232	6.8	79:47
———	Herman Hamer	Laird	5	SE	1310	112	11.7	———
———	Stub Quinby	Mono Special	6	SC	1250	88	14.2	———
———	B. B. Smith	P. S. of E.	7	SC	1440	100	14.4	———
Second	Lowell Bayles	Gee Bee Sportster	8	SE	1150	85	13.5	116:40
Fifth	W. H. Cahill	Great Lakes	9	C	1750	278	6.3	98:84
Tenth	W. H. Holliday	Great Lakes	12	C	1750	278	6.3	44:00
———	Joe Meehan	Great Lakes	13	SC	1750	278	6.3	———
Seventh	Stanley Stanton	Cessna	16	SE	1400	118	11.9	72:50
Eighth	J. R. Wedell	Wedell-Williams	17	SC	1440	120	12.0	63.13
———	R. A. Hosler	G. & G. Special	18	SE	1230	75	16.4	———
Ninth	Cecil Coffrin	Great Lakes	20	C	1750	278	6.3	56:10
———	J. Kruttschnitt	DH Moth	21	SC	1700	243	7.0	———
———	H. Mummert	Mercury	22	E	1540	125	12.3	———
———	E. B. Todd	Alexander	23	SE	1500	120	12.5	———
Fourth	H. H. Ogden	Ogden Osprey	25	C	4350	312	7.2	103:90

(Engines)* C—Cirrus; SC—Cirrus Supercharged; E—Ensign; SE—Supercharged Ensign.

and cost less than the construction necessary with an upright engine installation. Additional weight-saving with the inverted engine resulted from the fact that it permitted a lower landing gear. The lower landing gear also reduced head resistance and the risk of nosing over.

For the first time also in this race, superchargers were used extensively on small engines. Heretofore superchargers had been used chiefly upon large motors at high altitudes. The De Palma supercharger, used on all the engines so equipped, was developed by Ralph De Palma, the famous automobile racing driver, and American Cirrus engineers for use in connection with the Cirrus upright and inverted engines. In operation in the race it was found to develop from twenty to thirty per cent additional horsepower and provide a better mixture of fuel which resulted in smoother operation as the result of the delivery of equal fuel charges to each cylinder. The supercharger acts as a vibration damper on the crankshaft and places no excess strain upon the engine, despite increased power and lower gasoline consumption per horsepower hour.

The race also demonstrated the advantage of the in-line engine in permitting improved cowling that gave added speed without sacrifice of cooling properties.

In the field of airplane construction, it is probable that the results of the race will continue to occupy engineers for some time to come. Among the eighteen planes there were five types of design: high-wing, mid-wing and low-wing monoplanes, biplanes, and one high-wing monoplane of the parasol type. The latter was the so-called California Cub flown by Larry Brown. The high-wing monoplane was the Ogden Osprey. The Cessna and Mono Special were of mid-wing design and the low-wing jobs included the Command-Aire, Pacific School of Engineering, Gee-Bee Sportster, Wedell-Williams, G. & G. Special, Mercury, and Alexander Bullet. The biplanes included the Great Lakes Speedster, the Laird, the DeHavilland Moth and four Great Lakes Trainers.

The wing areas of these ships varied from seventy-five square feet (G. & G. Special) to 312 square feet (Ogden Osprey). The wing loading per square foot varied from 5.8 pounds for the Great Lakes Speedster to 16.4 pounds for the G. & G. Special, this ship thus combining the smallest wing area with the highest wing loading.

The Ogden Osprey, with a gross load more than three times that of some of the ships, is a six-passenger cabin plane powered by three Cirrus motors. It was the only multi-motored plane in the race.

Although Gehlbach's Little Rocket had a wing area of eighty-eight square feet compared with Bayles's eighty-five square feet, the Gee-Bee Sportster had a much lower landing speed. This is attributed to the fact that Hosler's ship had a thick wing, whereas the Little Rocket had an extremely thin wing section. At the same time Gehlbach's craft showed a surprising ability to climb, doing as well or better than ships of larger wing area and seeming completely to contradict the theory that thick wings and large area are necessary for climbing.

To gain the additional lifting power given by a convex upper surface, Hosler had recourse to flaps achieved by adjusting his ailerons so that both might turn down together in addition to acting in opposite directions as is necessary for usual maneuvers. By turning both down, Hosler achieved a convex wing, although one with a somewhat sharp angle instead of a smooth slope of the usual wing. Its effect appeared to be entirely satisfactory. The G & G Special was noteworthy in that it had a single landing wheel beneath the center of the fuselage with skids attached to the wing ends.

Harvey Mummert's Mercury was interesting because of the fact that it sat probably closer to the ground than its competitors. Mummert took full advantage of the inverted engine which, by raising the prop, made it possible for the engine to be placed lower down. His craft was equipped with retractable wheels which could be drawn into the very thick wing of his plane. A trap door closed after them and completely streamlined the under side of the full cantilever wing.

Novel cockpit enclosures were built in many of the planes; Mummert's ship again attracting attention in this particular with an enclosure that slid down, when not in use, into the side of the fuselage. B. B. Smith had a sliding cockpit in the Pacific Engineering craft which, when not in use, ran forward over the fuselage on a pair of tracks.

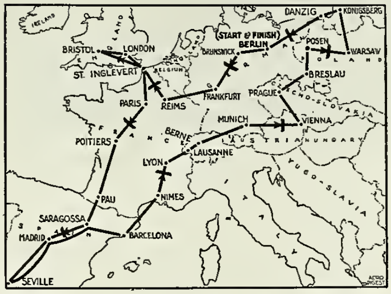
The extensive use of Airwheels to replace shock absorbers was noted upon many of the planes, as well as the device of employing landing gear struts to brace wings.

EUROPEAN LIGHT AIRPLANE TOUR

By Edwin P. A. Heinze

PERHAPS the most important light plane contest of the year in Europe was the Challenge Internationale de Tourisme completed in August. This competition was inaugurated last year by the Aero Club of France for the purpose of fostering the construction of light low-cost touring planes to be used by private persons. It grew out of the French Touring Competition which the club had sponsored annually for several years. In last year's event, the winner was a German pilot, Herr Morzik, who flew a Siemens-Halske-powered B.F.W. plane, and attained 138.5 points out of a possible maximum of 165. Second was Captain Broad in a Moth and third J. E. Carberry in a German Raab-Katzenstein machine, which, in the touring contest, proved to be the fastest of all competing planes. Because the German Airboard last year gained the trophy offered by the French club, it automatically acquired responsibility for organizing this year's competition. The trophy becomes the permanent property of that national organization that wins it for the third time.

The task of planning this year's event was given to the German Aero Club, the vice president of which, Gerd von Hoeppner, headed the committee on arrangements. The German club, in view of the experience gained in last year's contest, proposed some alterations in the conditions of the competition that were accepted by the international body. These changes pertain primarily to the technical tests, which this



Route of European light plane tour

year took place after and not before the European tour of the competing planes. Only those planes were eligible which successfully completed the air tour. This is a logical improvement, since the technical tests after the tour yield more accurate data concerning the true qualities of the planes and motors than if they are tested in a new or recently overhauled condition.

Another modification has to do with speed, which this year was not considered of such paramount importance as last.

The planes were again divided in two classes: the first consisting of those with a weight empty of from 322 kilograms (705 pounds) to 460 kilograms (1,014 pounds); and the second, those weighing less than 322 kilograms. The actual weight limits were 400 kilograms (881 pounds) for the first and 280 kilograms (617 pounds) for the second class. But mainly in order to meet the requirements of the British competitors, who participated this year as a national group, a margin of fifteen per cent overweight, instead of ten per cent as in the previous year, was allowed. For both classes maximum speeds were set, no awards being made for speeds above ninety-six miles per hour for the small and 109 miles per hour for the larger class. The idea underlying this stipulation is that it fosters reliability, comfort and safety rather than mere high speed.

As a new feature, the contest this year included a take-off and landing test. In this the competitors were required to take off toward an obstacle eight meters high (26.25 feet) from a distance not exceeding 400 meters. The obstacle consisted of two poles with a line draped with flags between it. The landing test was similarly arranged.

Although more than a hundred machines planned to start, only sixty planes actually turned up for the start. The closing time for arrivals was noon on July 18. Five minutes before the noon hour, a Moth piloted by the Spanish Archduke Antonio Habsburgo-Borbón arrived as last entry. All sixty of these machines, however, having been painted with the starting numbers and given final attention by their crew, next day flew from the rally port of Berlin-Staaken twenty miles to Berlin's central airport, Tempelhof. Here the Luft Hansa

GERMANY

Machine	*Engine*	*Pilot*	*No.*
Klemm L.26 V	Argus 100 h.p.	Lüsser	A2
Junkers Junior	Genet 80 h.p.	Roeder	A8
Junkers Junior	Genet 80 h.p.	Risztics	A9
B.F.W. M.23 c	Argus 100 h.p.	Morzik	B3
Arado L2 a	Argus 100 h.p.	Stutz	B4
Albatross L101	Argus 100 h.p.	Stein	B5
Klemm L.25 a	Salmson 40 h.p.	Osterkamp	B7
Klemm L.25 e	Argus 100 h.p.	Poss	B8
Klemm L.25 e	Argus 100 h.p.	Dinort	B9
Klemm L.25 e	Argus 100 h.p.	Notz	C1
B.F.W. M.23 c	Argus 100 h.p.	Von Freyberg	C3
B.F.W. M.23 c	Siemens 89 h.p.	Offermann	C4
B.F.W. M.23 c	Siemens 89 h.p.	Von Köppen	C5
B.F.W. M.23 c	Argus 100 h.p.	Von Waldau	C6
B.F.W. M.23 c	Argus 100 h.p.	Von Massenbach	C7
Arado L2 a	Argus 100 h.p.	Von Dungern	C8
Arado L2 a	Argus 100 h.p.	Peschke	C9
Arado L2 a	Argus 100 h.p.	Dr. Pasewaldt	D1
Albatross L100	Argus 100 h.p.	Von Oertzen	D2
D.18 Darmstadt	Genet 80 h.p.	Neininger	D4
Klemm 25 IV a	Genet 80 h.p.	Spengler	D5
Klemm L.25 I a	B.M.W. 50 h.p.	Von Gravenreuth	D7
B.F.W. M.23 b	B.M.W. 50 h.p.	Böhning	D8
Klemm	Genet 80 h.p.	Benz	E1
Junkers Junior	Siemens 89 h.p.	Gothe	E2
Klemm L.26	Siemens 89 h.p.	Siebel	E6
B.F.W. M.23 c	Argus 100 h.p.	Kruger	E8
B.F.W. M.23 c	Argus 100 h.p.	Aichele	E9
B.F.W. M.23 c	Siemens 89 h.p.	Dr. King	F1
B.F.W. M.23 c	Siemens 89 h.p.	Polte	F2

POLAND

P.Z.L. 5	DH Gipsy 100 h.p.	Gedgowd	O1
P.Z.L. 5	DH Gipsy 100 h.p.	Orlinski	O2
P-W.S. 8	Walter 85 h.p.	Dudzinski	O5

POLAND (continued)

Engine	*Machine*	*Pilot*	*No.*
P-W.S. 50	Cirrus 85 h.p.	Babinski	O6
P-W.S. 51	Genet 80 h.p.	Lewoniewski	O7
P-W.S. 52	DH Gipsy 85 h.p.	Rutkowski	O8
R.W.D. 4	Cirrus 100 h.p.	Zwirko	O9
R.W.D. 4	Cirrus 100 h.p.	Karpinski	P1
R.W.D. 4	Cirrus 100 h.p.	Bajan	P2
R.W.D. 2	Salmson 40 h.p.	Plonczynski	P3
R.W.D. 2	Salmson 40 h.p.	Wieckowski	P4
R.W.D. 2	Salmson 40 h.p.	Muslewski	P5

SWITZERLAND

Breda 15 S	Walter 110 h.p.	Pierroz	S1
Klemm L.25	Argus 100 h.p.	Kolp	S2

GREAT BRITAIN

Avian	Cirrus 104 h.p.	Thorn	K1
Moth	Gipsy 100 h.p.	Broad	K3
Arrow	Gipsy 120 h.p.	Andrews	K4
Moth 60M	Gipsy 120 h.p.	Butler	K5
Moth 60M	Gipsy 120 h.p.	Lady Bailey	K6
Mono Special	Warner 110 h.p.	Carberry	K7
Moth	Gipsy 120 h.p.	Miss Spooner	K8

FRANCE

St. Hubert	Walter 110 h.p.	J. Maus	L2
Caudron 193	Renault 95 h.p.	Arrachart	L3
Mauboussin	Salmson 40 h.p.	Fauvel	L1
Caudron 193	Renault 95 h.p.	Cornez	M1
Caudron 193	Renault 95 h.p.	Finat	M2
Caudron C232	Renault 95 h.p.	De MacMahon	M6

SPAIN

C.A.S.A.	Gipsy 85 h.p.	Navarro	T1
Moth	Gipsy 85 h.p.	Habsburgo-Borbón	T5
Moth	Gipsy 85 h.p.	D'Estremera	T7

Table showing the entries in the Challenge Internationale de Tourisme in Europe last month

Cranking an Argus engine Klemm monoplane for a trial flight at Berlin airport.

The C.A.S.A. parasol monoplane, piloted by Rodriguez, at the Berlin airport

had provided space for the machines in its hangars by allowing its own machines to stand out in the open all night. The weather, it should be mentioned, was miserable.

On Sunday, July 20, all machines (thirty German, twelve Polish, two Swiss, seven British, six French and three Spanish) started in quick succession and were on their way within an hour of 9 o'clock in the morning according to schedule. They had a tour of 7,560 kilometers (4,700 miles) ahead of them, in the course of which nine countries were to be reached and twenty-seven obligatory landings made. This year's route was somewhat more difficult than last year's, for not only was the English Channel crossed twice, but also the Pyrenees mountain range, which is about 9,000 feet high. The route and the obligatory stops are as follows:

Country	*Stops*	*Miles*
Germany	Berlin (starting point)	000
Germany	Brunswick	125.5
Germany	Frankfort-Main	168
France	Reims	214
France	St. Inglevert	149
England	Bristol	243
England	London	95
France	Calais	102
France	Paris (Orly)	152
France	Poitiers	178
France	Pau	225
Spain	Saragossa	113
Spain	Madrid	178
Spain	Seville	238
Spain	Madrid	238
Spain	Saragossa	178
Spain	Barcelona	155.5
France	Nimes	214
France	Lyons	122.5
Switzerland	Lausanne	99.5
Switzerland	Bern	48
Germany	Munich	208
Austria	Vienna	228
Czechoslovakia	Prague	158.5
Germany	Breslau	128
Poland	Posen (Poznan)	90
Poland	Warsaw	178
Germany	Königsberg (East Prussia)	174.5
Freestate Danzig	Danzig	83.5
Germany	Berlin	252.5
Total		4,700

To prevent undue racing between the competitors, two forced stops were included: one at Pau, where the machines were not permitted to take off for the flight over the Pyrenees into Spain before July 22 at 7:00 a.m.; and the other at Lausanne, where the machines, which had arrived early, were not allowed to start before the morning of July 25. This enabled the machines at the rear to catch up to some extent.

Each competing machine was required to carry at least one passenger besides the pilot all through the competition. Different passengers were allowed to fly in the plane,

A B. F. W. monoplane with Argus engine. This type won last year's contest.

A roofed-in Klemm 25 III with a Genet 80-horsepower engine, piloted by Spengler.

A Polish PWS plane with Cirrus Mark III 85 h.p. engine; pilot, Z. Babinski

but no change of pilot was permitted. On the tour points were awarded not only on the average speed but also the erliability of the machines. All machines were required to spend the nights in one of the obligatory stops, where they had to arrive before 8:00 p.m. to be rated as arriving that day.

Points for speed were awarded as follows:

First Class—Machines Weighing from 322 to 460 Kilograms

0 points for each kilometer from 80 to 90 kilometers per hour.
3 points for each kilometer from 91 to 135 kilometers per hour.
2 points for each kilometer from 136 to 155 kilometers per hour.
1 point for each kilometer from 156 to 175 kilometers per hour.

Second Class, Machines Weighing Empty Up to 322 Kilograms

0 points for each kilometer from 60 to 70 kilometers per hour.
3 points for each kilometer from 71 to 115 kilometers per hour.
2 points for each kilometer from 116 to 135 kilometers per hour.
1 point for each kilometer from 136 to 155 kilometers per hour.

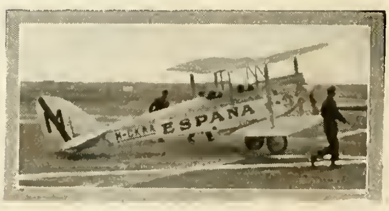
Observe how the higher speeds are rated relatively less than the lower speeds. Machines having a lower speed than eighty or sixty kilometers, respectively, were eliminated from further competition. Also no points were awarded for average speeds exceeding the maximum speeds indicated in the table. The maximum number of points any one machine could obtain for average speed was 195.

The awards for reliability were made in the following manner: Each machine at the beginning of the tour was credited with seventy-five points. As the tour proceeded, deductions of fifteen points were made for failures to spend a night at one of the obligatory stops. If the same machine during the tour failed to reach one of the stopping places or did not arrive in time to pass the control for the second time, it was penalized thirty points. If a plane failed to proceed from one stopping place to the next in one day, it was penalized ten, and if this occurred a second time, twenty points. Also, except for the landing wheels and propeller, all important parts of the machines were either marked or sealed and could not be replaced during the tour. The propeller could be replaced provided a spare one was carried throughout the tour. This propeller was required to be exactly like that with which the plane was fitted at the outset. For opening the sealed crankcase, pilots were penalized thirty points.

Thus, in the air tour, the machines could

A D.H. Moth 60 M monoplane with a Gipsy 120 h.p. engine, piloted by Butler

A Polish PZL plane with D. H. Gipsy 100 h.p. engine, piloted by B. Ovlinski



A D.H. Moth with Gipsy 85 h.p. engine, piloted by Spanish Archduke A. Borbon

gain a maximum of 195 points for speed and 75 points for reliability, a total of 270 points.

In the technical tests following the tour 140 possible points were awarded for practical properties, sixty points for take-off and landing and thirty points for fuel consumption, making in all 230 points, so that the best machine in the entire contest could attain a maximum of 500 points.

The following machines and pilots started:

It will be seen that only one American light plane, the Mono Special piloted by J. E. Carberry, took part in the race.

From the first day's flying it became evident the British fliers were out to win at all hazards. The weather was abominable. Rain and storm obscured vision and tossed the machines about as if the elements had turned loose to stop the event. And these conditions continued during the entire tour. On the first day, nevertheless, fifteen machines reached St. Inglevert, and only one remained as far behind as Frankfort-Main. The British pilots and their machines took the lead from the start and arrived at St. Inglevert in quick succession. All except one of the French team came in, as did two Germans, Morzik and Polte, and a Polish competitor. The Spaniard Navarro, on landing at Frankfort, broke his landing gear and was forced to retire, leaving only two Spanish contestants in the contest. Two other German pilots, Aichele and Von Waldau, had to make emergency landings, the former at Helmstedt, the latter in Luxembourg territory. But both were able to carry on a little later and to make up for lost time in a credible manner. On his arrival at St. Inglevert, the Polish pilot T. Karpinski was so ill and exhausted that he was compelled to go to a hospital and retire from the contest. While the leaders spent the night at St. Inglevert, the main body of thirty-five machines stayed at Reims. The first pilot who arrived at St. Inglevert was Captain Broad, who had fetched up A. S. Butler and his wife, the leaders on the first part of the stretch. With the stops at Brunswick, Frankfort-Main and Reims, he had covered the distance—about 500 miles—in nine hours.

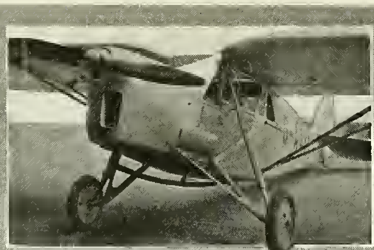
On the second day of the tour, July 21, because the weather was as bad as on the first day, those at St. Inglevert were grounded for some hours before they were given permission to venture the hop across the Channel to England, where Bristol was the next goal. In the meantime, most of the men who had been at Reims had come in to St. Inglevert. The German pilot Dinort crashed into the machine of another German pilot, Göthe, causing damage which was repaired after several hours. Two competitors having already dropped out, there were then fifty-eight in the contest. In spite of a head wind blowing at thirty-seven miles per hour against the coast, a group of fliers headed by S. A. Thorn, in his Avro Avian, went up and succeeded in making the crossing. The majority of the others then followed their example and flew to Bristol. Six pilots the same day left Bristol again, landed at London and recrossed the Channel, touching St. Inglevert, continuing to Paris for the night. They were Thorn, Butler, and Miss Spooner of the British team and the Frenchmen Arrachart, Cornez and Finat. Eighteen other planes, among them those of Lady Baley, Broad, Andrews, Morzik, Polte and Osterkamp, also recrossed the Channel but remained at St. Inglevert. Lüsser, the brilliant German pilot who on two successive occasions won the Belgian King's Cup, remained in London, as did Carberry and five others, while nine competitors stayed at Bristol for the night. At St. Inglevert there were still eighteen machines that had not yet ventured the first Channel crossing. Twenty machines of the sixty that had started out belonged to the second or lighter class, and were of course not so well suited to fly against strong adverse winds as the heavier machines, but four of them were in the leading group in or nearing Paris.

On the third day, July 22, the Paris group started for Poitiers and Pau prior to crossing the Pyrenees to Saragossa in Spain. The lead was again taken by Thorn, who was followed closely by Miss Sponer and Finat. This part of the tour was the most difficult because there are few landing places in the rocky declivities of the mountain range, which where the planes crossed has a height of 8,500 feet. The German fliers were able to gain on the leaders and a number of them reached Paris by noon. The remaining eighteen machines at St. Inglevert also made the crossing to England. The Polish pilot Muslewski had to make a forced landing near Châlon-sur-Marne.

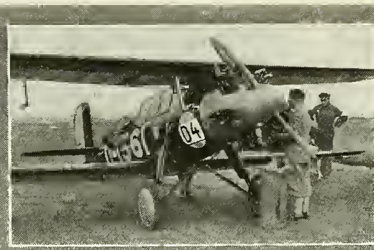
The first and second groups to cross the Pyrenees were handicapped by strong head winds. The first group was able to continue from Saragossa to Madrid, but the second was compelled to stay at the first Spanish stop. Butler was the first to land at Madrid at 3:30 p.m., followed by Finat and Arrachart. The last man in was Thorn.

On the fourth day, Wednesday, July 23, only fifty-five machines remained in the contest. After the passenger in Von Oertzen's new Albatross was accidentally killed in Bristol by running into the propeller,

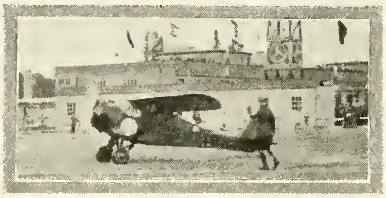
(*Continued on page* 152)



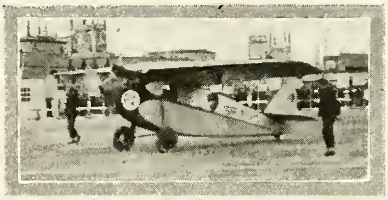
A D. H. 60 M with Gipsy II 120-horsepower engine and folding wings.



Darmstadt College biplane with Genet 100-h.p. engine; pilot, Neininger.



Only American light plane in the contest, a Mono Special, piloted by J. E. Carberry



Polish RWD 4 plane with ABC Cirrus-Hermes 105 h.p. engine; pilot, Z. Zuriko

A Polish PZL biplane, piloted by J. Gedgowd, with D.H. Gipsy 100 h.p. engine

A French Caudron monoplane with Renault 95 h.p. engine, piloted by Finat.

A Polish PWS 51 plane with Genet 80 h.p. engine, piloted by G. Lewoniewski

The French Peyret-Mauboussin monoplane landing at Berlin airport.

PERSONAIRLITIES

BY
Cy Caldwell

As you six patient readers may have noticed, I have conducted this department, not by any personal literary skill, but simply by the exercise of a sort of low animal cunning. Month after month, year after year, these pages of biography have appeared with monotonous regularity—and with surprisingly little effort on my part. That I should be able to grind out all that I have ground out through the Ages is not remarkable. But what is truly wonderful, at least to me, is the fact that I do so little of the grinding myself. Kind friends do most of it for me. There is where the real skill comes in—to get them to do it.

This month, for example, I have forced a real author to work for me, absolutely free. He's a man whose literary work commands a high price in the magazine field—too high a price, in fact. Not that his work isn't worth a good price, for it is. But he is a master salesman who dashes into the sanctum of an editor, talks him into a daze, and emerges shortly with a check for about twice the amount that the editor would have paid if he hadn't been hypnotized. But this literary fellow is a sheet salesman of the high pressure type, and such a humble growth as an editor is easy meat for him.

To get an author of this stamp to work for nothing on a typewriter is, I maintain, the height of something or other—probably the height of low Irish conniving. But I managed it, and am justly proud to present to you six readers Captain Elliott White Springs, in person, for the first and only time in his life giving his words to the world free of charge, and thereby allowing one Cy Caldwell to collect a living without working for it. When he realizes what he has done, he will gnash his teeth in rage and send me a bill, which, I hasten to inform him, will not be paid. This is simply a case of one literary trickster outsmarting another—a "Greek meets Greek" sort of business. Well, he owes me this, anyhow. I once gave him the plot of a story that he wrote and sold. He dedicated the story to me, but kept the check himself. Next time I give any of these literary rascals a plot they have my full permission to dedicate the thing to themselves. I'll be content with part of the check.

Well, I've been after Elliott for a biography for some three years, but he always proved too smart for me. "Write the thing yourself," he would reply. "You know all about me—why should I do your work, you loafer!" He was right. His biography has been in Who's Who for years, and I only had to grab the facts and drape a few fancies about them. But I naturally had objections to that course. My reputation as a loafer was at stake. Was I to demean myself by working when with the exercise of a little rascally ingenuity I could inveigle a famous author into writing for me? Certainly not. So I had at him with a lengthy letter in which I charged him with lowering the fair name of pilots by mentioning drinking too frequently in his stories—as though I hadn't done the same thing myself for years and years!

Well, poor old Elliott was pained, hurt and grieved, also infuriated. He seized his typewriter by the neck and came back at me with the following, which I now insert gladly into this department and thus evade just that much labor myself this month. Incidentally, the opinions of an old war pilot, an American Ace, are worthy of serious consideration by the younger pilots. So here's Captain Elliott White Springs, pinch-hitting inadvertently for me:

"I have never written a line about commercial pilots taking a drink, being present while anyone else took a drink, or being in a place where a drink was served. None of the characters in any of my stories have ever held a Department of Commerce License of any sort." (This is quite true, as I know. All of his air stories are of the war.)

Elliott White Springs—author, pilot

"Personally, I do not believe that likker and gasoline mix. I don't think that likker mixes with anything, not even with necking. My friends tell me that they do their best necking without likker. Many a well-planned week-end has been ruined by a flask.

"I have lost a number of friends who were killed in automobiles with the demon rum at the wheel. I have never seen anyone killed in a plane due to likker, but I have seen a number of crashes that were unquestionably due to hang-overs, and I will not take a man up with me who has been drinking heavily.

"Personally, I decided to quit drinking last November. I mean quit for good. The reason was that I figured I had had enough. I have not been a drinker to an extent since I had my stomach taken out five years ago. Other people can do as they please, but I have lost my interest in likker. It interferes with my work.

"During the war, the air service was run on gasoline, red tape and likker in equal portions. I have, it is true, attempted in my humble way to give a picture of this air service in England and France. To avoid mention of likker in these stories would be like describing the Bible without mentioning God. It would be Salome with no dancing, Ben Hur without a horse, Uncle Tom with no cabin, Peggy Joyce with no husband, Hoover without a commission, radio without an advertisement, Byrd without a Pole, and Miss America without an uplift brassiere. I do not believe I have ever exaggerated the conditions that existed in the R.F.C. or the U.S.A.S. in France." (He certainly has not.)

"However, I will not write any stories about commercial aviators who drink. I wouldn't fly myself while I was drinking, and I certainly wouldn't encourage anyone else to do so. I enjoyed your USAIG bulletins* on safety flying and heartily endorse your sentiments. The first crash I ever had was due to an instructor who had looked too long upon a whiskey bottle.

"Have you ever tried to land a fast scout when the ground wouldn't stay still and you saw two altimeters, and a little pink zebra kept opening your fine adjustment? Have you ever taken a beautiful blonde out in the garden and have her hiccough and say, "Sure, go ahead, but make it—hic!—snappy—and let's—hic!—get back to the champagne?" Have you ever had a drunken friend take you through an open bridge into an icy river? Have you ever—? Well, if

*Bulletins Cy Caldwell has been writing for the United States Aviation Underwriters, Inc., to promote safer flying.—Editor.

(Continued on next page)

In one Year

Airwheels have changed safety standards

Just one year ago this month the first announcement of Goodyear Airwheels was published.

Up to that time, no one had built or announced anything even remotely like this great soft wheel-and-tire combined.

It was a new contribution to safe flying—a complete departure from the tire which the airplane industry had borrowed from the automobile.

Most people now know the advantages which the Airwheel introduced—safe landings on mud, plowed fields, sand and swamp land, where planes never dared to land before—smoother take-offs and landings on rough fields—less jolt for the airplane's mechanism—safe down-wind and cross-wind landings—the hazards of ground loops removed—and remarkable improvement in braking.

But some people still do not know that *only Goodyear can give you Airwheel safety*—safety far beyond anything you can get with any tire that falls short of the extreme low pressure and tremendous air volume found in Airwheels.

Bear in mind that Airwheels operate at amazingly small air pressure—as low as five pounds.

Bear in mind also that the success of Airwheels is based upon Goodyear hubs and brakes used in conjunction with Goodyear Airwheels.

Bear in mind that, as pioneers and as great manufacturers, the Goodyear organization offers experience in this field of aviation far beyond that which any other company can place at your disposal.

Before you make any changes in the design of your ships to accommodate low pressure tire equipment, write Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California, for valuable engineering data.

GOODYEAR

EVERYTHING IN RUBBER FOR THE AIRPLANE

(*PersonAlRlities continued*)

you have, you know why I decided that the wisdom that cometh with years rides on a wagon with a sprinkler at the rear end, and Martinis ruin that schoolgirl complexion."

Thus speaketh Captain Springs, pilot, author and manufacturer of non-skid sheets for people who care. I can endorse his sentiments one hundred per cent—which possibly only proves to the younger pilots that we both are in the sere and yellow leaf. Probably. Besides, I admit that it's a standard procedure for old-timers to tell young-timers not to do what *they* used to do. But pause on this thought: Elliott and I did most of our drinking when likker really was aged in the wood, and consequently didn't hurt us very much. If you want to imitate us today in America you have to do it with a concoction that may be real likker and may be embalming fluid. A lot of the jobs that undertakers get are simply bootleggers' tactical errors.

Well, old Elliott's been such a help to me this month that I don't mind writing his biography myself; in fact, I have to, confound him, for he says: "I don't think your readers would be interested in my biography. Haven't done much flying for the past two years. I am too busy with the textile business. I always was a ham-handed pilot and always will be. I have never learned to fly by compass with any degree of confidence or accuracy. When the railroad tracks go into a tunnel, I go back home."

Which isn't true, of course, though if I had a home like his I'd turn back to it at the slightest excuse. He has one of those South Carolina estates covered with cotton and minus the usual mortgages—his family dates back to the "ol' massa and missus" period—private swimming pool, flying field, farms, plantation, wine cellar, early American furniture, grandfather's clocks and all those fixings that don't make life tough to live. I visited him some five years ago, when neither of us was on the wagon. We dug out bottles that grandpap had stowed away so the dam Yankees couldn't get them. God bless grandpap!

Elliott was born near there some place—Lancaster, S. C., if I remember rightly, in July, 1896, and went to Culver Military Academy, then to Princeton, where he began flying in 1917. He flew with the Americans and the British at the front, where he is officially credited with the destruction of twelve enemy aircraft in his spare time. His really serious war service was performed in the Savoy Hotel and the Carlton Long Bar, London, where he flourished as a chief supporter of the distilling and brewing interests of the British Empire and as a patron of the arts, or of that part of the arts represented by the chorines of the musical revues. For this he will be remembered long after the world has forgotten those twelve Fokkers, or whatever they were. He will go down in history as the lad who disclosed what the heroes of the air were really up to over there.

Between parties he was attached to the 85th Squadron, R.A.F., and 148th U. S. He was made a squadron commander on November 3, 1918, in recognition of his good work at the Savoy, which needed reconditioning after he left it. He came home, flew in the New York-to-Toronto race in 1919, got that private airport going, manufactured cotton sheets, and wrote short stories and novels—which are heartily recommended to all who want to know what life was like for those who rode the skies during the late foolishness. His last novel, "Contact," is the best he has done, while "In the Cool of the Evening" is the most amusing—a volume of snappy short stories. He has written a few stories in most atrocious rhyme, but I have practically forgiven him for those—we all make blunders. His writing is vivid, swift-moving, careless; his style might best be described as a complete lack of style—it's just Elliott Springs, at his best and his worst. He's a tonic for anyone who has waded through much standardized writing.

In a recent letter to me, in which he stated that the textile business made such demands upon his time that he doubted if he would write much more, Springs said: "I started out writing because the public had an erroneous idea of war flying and war fliers. I wanted to tell the truth about the matter whether anybody liked it or not, and as you know, a lot of people didn't like it. Well, times have changed. The average high school boy knows more about modern aviation than I do. There are a hundred flappers that can handle a ship better than I can. Which is all right by me if they would just wear cotton instead of silk when they do it."

A MAN of few words is Pilot E. E. Hughes, who, the last I heard from him, was in Memphis, Tenn. "Ex Army. Ground School at University of Texas. Commissioned at Rich Field, Waco, Texas. Went through Brooks Instructors' School. Sent to Kelly No. 2 as Gosport instructor. There until discharged. At present hopping passengers, instructing students. That's all." A man as careful not to wast words as Hughes must do his instructing by sign language. I wish we had more like him at N. A. A. banquets.

TOM D. PARK, who was born in Platte City, Mo., April 16, 1904, started railroading in 1919, firmly intending to become president of the company without undue delay. Undue delay, however, was all he experienced in the railroad business, so in his endeavor to climb up the ladder of success he switched to airplanes, in which he had been flying occasionally since 1919. In four years he managed to acquire an old Canuck, which Dorsey Askew taught him to fly.

Tom D. Park

This happy event occurred at Ardmore, Okla. Meanwhile the railroad salary had not been expanding as Tom would have liked it to expand, so he switched to barnstorming, survived, and in 1926 became chief pilot for McIntyre Airport at Tulsa, and "wouldn't trade places with any railroad president," he says. Outside of that peculiar statement, he seems perfectly normal.

EARLY BIRDS

PARKER DRESSER CRAMER was born at Lafayette, Indiana, girls, on March 16, 1896. That sure was a big date in the lives of some women. If that event hadn't occurred, many a lonesome evening would have been spent by many a poor, longing lady. But all is well for the fair sex. Shorty Cramer, himself, in person, arrived in this vale of sorrow and casual dates back in 1896 and still is with us. He occasionally goes away to the North or South Poles, or somewhere in their vicinity. But seals and polar bears do grow tiresome, and he pines for the white lights. So back he comes and parks for awhile at the Explorers Club, New York, where a telephone call will find him and send him leaping forth for a taxicab, date-ward bound.

But to begin at the beginning, the reason Parker Dresser Cramer got cut down to Shorty Cramer was that early labors apparently stunted his growth—in fact, to such extent that if he ever gets up to speak at a banquet, those at the far end of the table, not believing it possible that he has risen, will call out, "Stand up, Shorty!" Upon which Shorty will reply indignantly, "I'm up, confound you!" and try to stretch an extra inch.

Those early labors that enabled Shorty to make such a hit with tall blondes consisted of building a glider at the age of twelve, working as a mechanic's helper for Charlie Willard at the age of thirteen, and working for Jimmie Ward and Baxter Adams at fourteen, and building and actually flying a glider at fifteen. All this told on him, of course, and stunted him to such a degree that once when I had him on a house-party with me, the hostess, who didn't know either of us—we just drifted in—said, "Mr.—er—Caldwell? was that the name? Well, do you think your little boy should have anything to drink?" The supplies seemed to be running low, so I said "No," and took his glass myself. He's never quite forgiven me.

Shorty got through high school, somehow or other, and went to work in Bradford, Pa., famous today as the home of Herb Shearer and Kendall Oil. That is where the famous Pennsylvania crude comes from. Here Shorty worked, daytimes at engineering and night-times at other matters we need not go into here. But he was progressing to such an extent that he moved on to the Curtiss company at Buffalo, and red-heads. He was in the research depart-

(*Continued on next page*)

(PersonAIRlities continued)

ment at Curtiss, and what department he was in with the rest of it I don't really know. I suppose it was research.

In 1916 he went with the Standard company, where he was assistant to the superintendent. Just what assistance he was I have never learned from the biography of him supplied me by his brother Bill. I suspect, however, not much. Shorty is usually tired, daytimes.

When the United States decided to make the world safe for J. P. Morgan's and Dwight Morrow's investments in allied bonds—which seems to be the only reason America entered the war—the bold Shorty entered the Air Service, first as a mascot and successively as a cadet, instructor and test pilot at various fields. None of the fields were within firing range of the enemy, however, for all were within the U. S. A. There he sat comfortably waiting for the armistice, which arrived in due course, to the chagrin of the profiteers.

In 1919 Shorty built a plane, about which the less said the better, and then he purchased a Canuck and barnstormed in Pennsylvania and New York, did experimental work for a fire-proofing company, and then took over the abandoned air mail field at Clarion, Pa. Here he surrounded himself with a weird assortment of junk in the form of pieces of airplanes, parts of hangars, sections of engines, and mud. These parts he would laboriously join together into what looked like an airplane, and fly off somewhere and sell it. He survived, more or less uncertainly, at this peculiar pastime until 1927, when he became one of the first members of the Inspection Section of the Department of Commerce. Here he was placed in the somewhat embarrassing position of having to condemn as unairworthy odd assortments of stuff he had glued together and had declared was an airplane. He, personally, thought they were airplanes, but the book said they weren't. And Shorty had to agree with the book—or stop eating off the Department. He gave them identification numbers and moved sadly away.

His hard life by this time had begun to tell upon him. The first indication of it was failing mental powers. By 1928 he had deteriorated mentally to a point where he was willing to fly as co-pilot and navigator with Bert (Fish) Hassel from Rockford, Ill., to Stockholm, Sweden. There's no use pretending that a man who does that sort of thing is quite right. We might as well come right out and admit that the trouble here is psychopathic. Away went these two poor fellows, to run out of gas over Greenland, and walk for two weeks to Dr. Hobbs' University of Michigan Expedition. They were saved, but not cured. In April 1929, away he went again to Nome, Alaska, and return. And as if that wasn't enough, in the summer of 1929, with Bob Gast and Bob Woods, off he went again, this time on the *'Untin' Bowler,* which was supposed to go from Chicago to Berlin. Of course it didn't get there. At Port Burwell, Labrador, an ice floe mercifully destroyed it, and the boys came back by boat. You might think Shorty would be

Shorty Cramer; Explorers' Club

cured by that time. Not so. When Sir Hubert Wilkins, complete with flowing beard, organized the second Wilkins-Hearst Antarctic Expedition, Shorty went along as pilot, with Al Cheeseman. He left civilization again and went down with the seals and sperm whales, from whose monotonous company he returned recently. He now, at this writing, sits in the Explorers Club, near the telephone, waiting for the girls to call him up.

I'VE mentioned Earle Ovington here before, as the first air mail pilot in America, but now he rates mention as the first flying underwater sewer inspector in the world. Here's a photo of him in a diver's suit to prove it. I had one with the helmet on, which was a more pleasing likeness, but I mislaid it. It seems the city, or whatever it is, of Santa Barbara, California, put in an outfall sewer. Nobody connected with the city engineering department was willing to go down and inspect the work. But Earle, who owns two lots out there, naturally wanted to test the disposal facilities of the new system, especially as regarded his two lots. So he dropped something down the hole on his lots and then dashed down to the sea in this suit to see if it came out or stuck somewhere along the line. It came out.

Earle Ovington as a diver and (right) with Mrs. Ovington in 1911

The other picture shows Earle and Mrs. Ovington standing before Earle's Blériot of 1911. Note the snappy sports suit Mrs. Ovington is wearing. If she had that rig today she could make three outfits from it. Just goes to show how much more we can learn about women today than we could then—and they still fool us. Also note the early castor-wheel shock absorber mechanism on the Blériot. It looks like the forerunner of Pop Cleveland's Aerol Strut. And note the struts that brace the engine. I suppose they were afraid all those forty or so horsepowers would drop to the ground.

Earle learned to fly in 1910 at Pau, France, under the famous Louis Blériot, first aviator to fly the English Channel, and returned to the United States with the first racing monoplane ever brought to America. I saw him win the Boston *Globe's* $10,000 prize for flying cross-country from Boston to Nashua, Worcester, Providence, and back to Boston. A pilot gets $3.50 for the same flight today. And they say pilots have progressed with aviation! I recall crowding up to get a glimpse of the marvel who could win $10,000—it's still quite a trick to win $10,000 at practically anything. I remember thinking he was a lot smarter than most of us. In fact, he proved it by getting out of aviation later on and going into real estate. But he's back in now, so I hardly know what to think of him. He designed the Roamair and flies around. But he still has his lots. I guess he's pretty smart, after all, though that diving business unsettles me slightly.

A. LIVINGSTON ALLAN, known as "Doc" Allan, has carried about 44,000 passengers without injury to a single person. That's a great record, and far more useful to aviation than many records turn out to be—the loop record, for instance! Doc learned to fly during the summer of 1915 at Hammondsport, New York, at the Curtiss Flying School under David McCullough. He passed his solo tests and received Aero Club of America Seaplane Certificate No. 42. That was on the old Curtiss flying boat with shoulder yoke controls, which I bet he couldn't fly today.

In December, 1915, he was commissioned as 2nd Lieut. in the Royal Flying Corps, Quebec, Canada. That's two ranks above Corporal, especially if they add the words "On Probation." He went over to England and instructed for five months. But the ferocious English cooking must have weakened him, for in 1916 he returned to the States and joined the U. S. Air Service as Chief Flying Instructor, and was stationed at Mineola with Bert Acosta and the late J. D. Hill.

At Mineola Doc secured F.A.I. Expert Certificate No. 67, after which he instructed at several fields and was discharged at Fort Worth in December 1918. In July of the following year he joined the Curtiss Flying Station at Atlantic City and proceeded to haul those 44,000 passengers for a view of the boardwalk and hot dog stands.

FIRST

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AIRPORT AND AIRWAY

Beauty—Confidence

CONSCIOUSLY or not, we are all strongly influenced in our preferences by external appearances. We'd rather own a motor car with clean, speedy lines than one of the old stilted, rolling box type, even though the latter might be actually faster and more dependable. We'd prefer to ride in a handsomely equipped Pullman car instead of one of those ugly old-fashioned wooden day coaches with the open platforms at both ends, even if the latter *were* safer and more comfortable. Even the most hard-boiled person imagines he perceives greater dependability and more satisfaction in that which appeals to his eye.

Air transportation is no less subject to this quirk in human estimates than any other form of commercial enterprise, and it is well that we take this into account. There are, of course, other more important problems to be solved before aviation can enlist sufficient patronage to be profitable. There is, for instance, the task of making aviation safer; of perfecting blind flying equipment and technique; of eliminating hazards at airports; of ostracizing foolhardy and useless stunt flying. Aviation will win favor only in the degree that it instills a feeling of confidence and reliability in the public mind. But in this respect, beauty and the appearance of permanence can also play a leading role.

It is at the airport that the air passenger receives his first and most lasting impression of aeronautical activity. True, he may scrutinize the craft in which he is to travel and conjecture as to its airworthiness, but he is usually willing to admit that, after all, he doesn't know enough about airplanes in general to form any definite opinion about this one in particular. His attitude therefore hinges pretty largely on the things he finds associated with that airplane. If he observes ugly, frail or temporary-looking buildings grouped hit or miss about the field, he is instinctively distrustful about the whole idea of flying. He feels that here is something which, like a street carnival, is thrown up overnight to rake in as many "shekels" as possible from a naive public and then pull stakes to the next lucrative township. When he enters his ship from a shack that is called "administration building" and sees at one side of the field a barn which he is told is a "hangar," he begins to suspect that something is being put over on him, that perhaps "airplane" is only a false name for the thing he is to fly in, and that probably it is as poorly constructed and maintained as those buildings on the airport.

Fortunately, such conditions are not universal, nor do they obtain at the majority of terminals served by the more important air-lines. I have used the negative reaction merely to emphasize more strongly the favorable effects of handsome, well-arranged buildings on an airport. There are several air terminals throughout the country where buildings of unusual beauty have been constructed. There are many others where attractive, if less magnificent, structures have been erected.

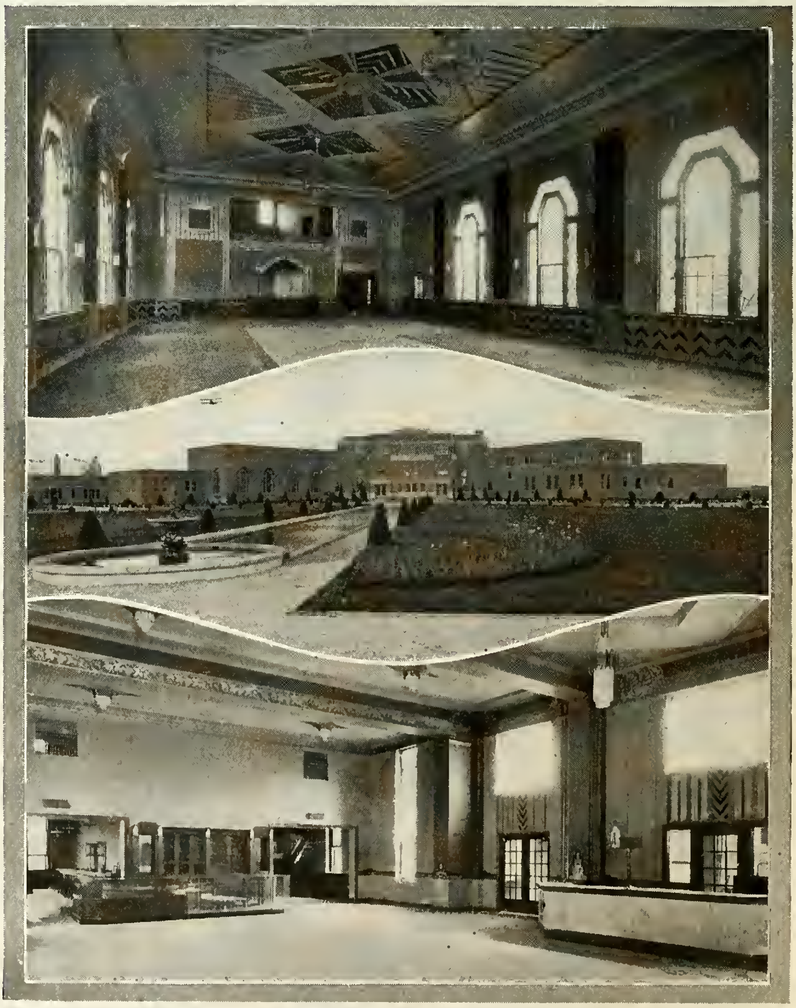
As examples of the refinement in airport architecture we may expect to find more wide-spread in the future, the terminal buildings at United Airport at Burbank, Calif., and Fairfax Airport at Kansas City are notable. Although the developments at these two fields do not represent the ultimate, they do indicate the trend toward beautification.

At both of these places, it is interesting to note, the effort to create attractive effects was not confined to the interiors and exteriors of the terminal buildings, but was carried out in the adjacent landscaping as well.

The parkway approach to the main entrance of the administration building at Fairfax is, perhaps, not excelled at any airfield in the United States. At each end is an artistic statuette fountain, and a long mirror pool, containing Japanese goldfish and water lilies, extends between. Along the sides of the pool are gravel walks set off by beds of roses and other flowers, and patterns of privet hedge and blue grass.

The landscaping at Burbank, if less striking, is nonetheless appealing. A large area around and between the buildings bears a good growth of lawn grass. Shrubbery is well placed. In front of the terminal building is a fountain lily pond surrounded by flower beds, and beyond is the forty-acre Burbank City Park.

In beautifying airport buildings, utility cannot of course be sacrificed. In fact, architectural treatment must necessarily be modulated to serve the purpose for which the building is intended. At both Fairfax and United, this compromise has been efficiently worked out. To avoid raising an obstruction to flying activity, the height of the terminal building at the former port has been limited to fifty feet, and most of the



The new terminal building at Fairfax Airport, Kansas City; (upper) main dining room, unfurnished; (center) approach side, showing fountain and mirror pool; (lower) waiting room looking toward grill and cigar stand

structure is even lower than that. Nevertheless, inasmuch as the total length of the building amounts to 400 feet, adequate floor space is provided. The control tower at the top of the building is so located that the operations manager can observe activities on the entire field and his view does not face the sun. Although the control tower on the United administration building is taller than that at Fairfax, it is no less advantageously situated and arranged. Extending from two opposite sides of the tower are wings giving the United building an overall length of 200 feet. These are so constructed that an additional story can be built over them later if necessary, or they can be extended in length 200 feet.

Both buildings are of substantial, fireproof construction, a fact which is the more emphasized by their exterior designs. The external features of the United building adhere to Spanish precedent so prevalent throughout Southern California. The outside walls are a special two-tone cream plaster, with red tile and brick trim. To harmonize with this combination, the roof is covered with red Spanish tile. Above the wings of the building are open promenade and observation decks.

The general exterior architecture of the Fairfax terminal building follows the modernistic style. The vertical lines of the buff-brick walls are well balanced with horizontal, variety being contributed by cut-stone trim in interesting ornamental designs.

The interiors of both buildings convey a feeling of substantialness and permanence perhaps even more strongly than the exteriors. But both carry out the motifs prevailing outside, except that in the United building the Spanish is combined harmoniously with a semi-modernistic theme, and at Fairfax the exterior effects are intensified inside to an ultra-modern style. In the Kansas City structure, severe vertical lines predominate in the main waiting room, as well as in the dining room. These lines are relieved by angular designs, variations in color and ornamental frieze just below the ceiling level. The steel sash windows, which provide ample daylight, contribute further to the effect. Complementing this general feeling are the light fixtures, which in the main dining room automatically produce fifteen shades of color lighting. Perhaps the most distinguishing feature of the latter room is the drapes, which are a special four-tone modernistic pattern of plum color with overdrapes of silver. This room has high-vaulted windows so that diners have a good view of activities outside. Although there is accommodation for 250 diners, there is sufficient extra space for a hardwood dancing floor in the center of the room and an orchestra balcony over the entrance.

The Spanish mode in the main waiting room of the United building adds a modernistic effect by the predominence of vertical lines. Less ornate than those at Fairfax, the interior decorations of this building are characterized by plastered walls enhanced by woodwork of antique mahogany. The floors are of polished square tiles.

With all this beauty of furnishing and

One of the artistic stairway entrances in the terminal building at United Airport

interior design, both buildings utilize space to best advantage. In each a spacious waiting room is located in the central section, with ticket counter, cigar and news-stand, check room, etc., conveniently situated either in or adjacent to this area. Each includes an attractive luncheonette with soda fountain and modernly-equipped kitchen. At United a private dining room is available for special parties. On the second floor deck, which is connected to the kitchen by a dumbwaiter, there are tables and chairs where light lunch or tea may be served. Seven office rooms are located in the northeast wing, and one in the second floor of the tower reserved for the weather bureau. The third floor, or control room, provides space for the operations management, radio and meteorological departments.

In the basement at Fairfax are the refrigeration plant and storage space for the kitchen above, heating and air-cooling plants, quarters for employees, and general storage rooms. The north wing, first floor, includes dining room, kitchen, ladies' rest room and check room; the south wing houses an eight-chair barber shop, men's rest room, physician's suite for Department of Commerce medical examiner, mail and express room, loading dock, and storage rooms.

The second floor of the building is divided into offices for airline operators and various affiliated aviation companies. The control tower is at the top of the building facing the field. On the operation manager's desk in this room are the loud speaking control and complete lighting and signal system of the port, as well as charts for weather reports.

Airport buildings of the type described are desirable not only because they provide facilities adequate to meet the future expansion of air traffic, but because they help to encourage that growth. Although it is somewhat difficult to conceive how they can produce any immediate profits, it must be remembered that they represent long-time investments; that their beauty, great as its initial cost may be, instills confidence in the permanence and therefore the present safety of air transportation; and that anything which contributes to such confidence is conducive to future profits.

Metropolitan Landings

COMMERCIAL aviation in all its phases has always been seriously handicapped because its airports are so distant from urban centers. The industry has been willing enough to admit that this is one of the most important problems confronting it, but thus far it has been unable to effect an efficient and not-too-costly solution. Numerous plans have been conceived for bringing terminal operations closer to the business sections of large cities, though few, if any, have ever been worked out on a thoroughly practical basis. Seaplane bases at cities located on bodies of water would be extremely satisfactory if it were not that their utility is confined to a single general type of airplane, and at present landplanes greatly predominate in number. Although it has been suggested time and again that landing platforms could be erected above office buildings, this has not been attempted because it is too difficult to procure finance for a project so experimental in character and because under most circumstances it would be impossible to provide a landing area sufficiently large for multi-engined transport planes to take off and land safely. The advantages of amphibion shuttle services from outlying airports to water areas close to business districts have frequently been counteracted by the inconvenience occasioned in transferring passengers and cargo from one plane to another. And similar difficulties have beset all such schemes.

Nevertheless, the fact remains that the faster the mode of transportation the closer its terminals ought to be to actual destinations; and that, inasmuch as aviation is the fastest known form of travel, it is not fulfilling its full degree of usefulness as long

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The station at Portland (Ore.) Airport, an example of good airport architecture

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as its airports are located several miles from centers of population. In view of the present business depression and scarcity of money, however, it is too much to expect that this condition will be rectified in the immediate future. But the business slump will pass, and air transportation will continue to grow and become more prosperous. It is not idle gesture, therefore, to consider plans now for the development of means which will eventually make it possible for planes to land in or near the heart of metropolitan districts.

Among the most interesting ideas in this line is one worked out by Grossman and Malevich, construction engineers of Pittsburgh, Pennsylvania. These two men believe it feasible to construct a landing platform over a river or other waterfront area adjacent to a city. This structure could be elevated sufficiently above water level to allow small vessels to pass below or even dock there to take on or unload cargo shipped by air. Moreover, it could be adapted to the particular conditions at that city where it would be built. The landing area, for instance, might be square or rectangular; it might be superimposed on a bridge structure across a river; it might, in fact, take any one of several forms. But the fundamental idea would remain the same.

The plan is sound and logical from an engineer's viewpoint. The cost, though somewhat greater than for conventional suburban fields, would not be excessive when future possibilities are considered. Roughly estimated, a structure of this type would cost approximately $6,000,000, which is considerably less than the cost of many railway stations. As much has already been spent on perhaps less useful aviation projects; certainly, at least, such a sum will not seem so excessive some day.

Such a landing platform would be built similar to a through-span bridge with large piers and supporting columns carrying massive arched trusses, crosswise and lengthwise. These trusses would support the steel work. The landing area proper would be a concrete floor.

Grossman and Malevich have worked up specifications and plans for an airport of this type as it could be constructed at Pittsburgh. The accompanying illustration shows the structure as they planned it for that city. In width it is about 500 feet, and in length approximately 2,500 feet. The field would be clear of all obstructions. A terminal building would be provided for the use of passengers, sorting of air mail, and other such activities. This building would be so located as to be almost entirely below the landing deck. Only enough of the building is above the deck level to provide a shelter canopy for protection of passengers when entering or leaving planes at the terminal. The terminal would provide a direct connection to the main streets and, under the landing deck, offer parking facilities for automobiles.

There would be no provision for hangars, except possibly for emergency use only. The designers of this type of airport believe that it should be used exclusively for the landing and taking off of transport planes, no attempt being made to replace existing suburban fields where elaborate hangar and shop facilities are already provided. Since space would be costly and could not be used unnecessarily, this type of landing field would operate in conjunction with outlying fields. In this respect it would be similar to modern railroad terminals which do not include roundhouses for the storing and inspection of locomotives, passenger cars and other train equipment inasmuch as facilities for that purpose can be provided more conviently at outlying shops and yards.

Planes could be stored at the suburban airport, where they could be inspected, tested and otherwise made ready for use. When needed for operations, they could then be flown to the air terminal to receive passengers and take off on scheduled time. Likewise, when the airplane arrived from a long journey, the passengers could be discharged at the terminal and the plane returned to the hangar for inspection.

Such a separation of shop and terminal facilities truly seems to have many points in its favor.

A possible type of airport of the future:—Landing platform designed by Grossman and Malevich as it might be constructed at Pittsburgh, Pa.

Continued Growth

THE true significance of the service air transportation has to offer is perhaps best evinced by the encouraging trends it is taking even in these hard times. Although the business depression has for a time at least crushed all meaning from the term "prosperity," it has failed to deprive the airlines of sufficient vitality to continue growing. True, increased patronage of the air passenger and mail systems might have been healthier if it had not been for the economic cataclysm, but certainly in that case we could not have been furnished with a more accurate barometer of the value of these services in our industrial life. In many respects, the present status of commercial aviation is analogous to the Darwinian theory of "the survival of the fittest." In this instance, however, it is not so much a matter of survival as of expansion. None of the great modern modes of transportation has perished; most of them have merely suffered an economic decline or stand-still. But air transport is probaby the only one which has continued to grow. And in this fact we may read its fitness in modern civilization.

On every hand, there is ample evidence of this evolution of which we have been speaking. Airline operators are reporting that their planes are flying with capacity or near capacity loads; announcements are forthcoming of new services being inaugurated; the Post Office Department is opening bids for new air mail lines, while the mail poundage carried on existing routes continues to increase each month.

But inasmuch as a discussion of concrete facts and particular examples is more convincing than generalizing, let us review some cases in point:

According to figures released by the Department of Commerce, there were ninety-seven domestic air transport services in operation as of August 1, and twenty-five American-operated foreign lines.

The domestic lines were divided as follows: Mail, forty; passenger, seventy; express, forty-eight. Foreign routes included: Mail, twenty-three; passenger, twenty-three; express, ten. All routes totaled 122. Since 1926 the number of routes has increased from nineteen to 122 domestic and American-operated foreign lines.

There were ninety-six more airports and landing fields in existence in the United States on July 15 than there were six and one-half months ago, according to a report compiled by the Aeronautics Branch, Department of Commerce, and made public by Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

On July 15, there were 1,657 municipal, commercial, intermediate, auxiliary, Army, Navy and miscellaneous Government and private airports and landing fields. On January 1, there were 1,561.

Ernie Pyle, Scripps-Howard Washington correspondent, points out that nearly as many passenger lines were started in the first six months of 1930 as in the whole of 1929.

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At this writing eighteen new passenger lines have been started this year, and another is to open September 1st. Last year twenty-one new lines, totaling 8,713 miles, were put into operation.

These new 1930 passenger routes include such lines as Albany-Boston, New York-Richmond, New York-Pittsburgh, New-York-Atlantic City, Cincinnati-Detroit, Columbus-Chicago, St. Paul-Spokane, St. Paul-Omaha, Pueblo-Amarillo, St. Louis-New Orleans, Dallas-Wichita Falls, San Antonio- Houston, San Angelo-Dallas, San Francisco-Oakland, Spokane-Seattle, Chicago-Madison, Kansas City-Omaha, and Atlanta-Nashville. The new route to open September 1st will operate between New York and Philadelphia and Washington.

Announcement was made by W. Irving Glover, Assistant Postmaster General, that bids for two new transcontinental air mail routes were opened in his office at noon on August 25, 1930.

The first route will run from New York City, via Philadelphia and Pittsburgh, Pa.; Columbus, Ohio; Indianapolis, Ind.; St. Louis and Kansas City, Mo.; Amarillo, Texas, (or from St. Louis via Tulsa to Amarillo, either or both routes) and Albuquerque, New Mexico; to Los Angeles, Calif.; and return, a distance one way of approximately 2,559 miles.

The second route will run from Atlanta, Ga.; via Birmingham, Ala.; Dallas, Fort Worth and El Paso, Texas; and via such points in New Mexico and Arizona as may be designated to Los Angeles, Calif.; and return, a distance one way of 2,008 miles.

These two new transcontinental routes are to be operated under the terms of the Watres Act, recently passed by Congress and signed by President Hoover. The contracts will be awarded on a space-mileage basis instead of on a poundage basis required under the old law known as the Kelly Act.

Among the new passenger routes inaugurated this year are three which are of sufficiently recent date to warrant some detail here.

A new transcontinental air-rail passenger service between the Pacific Northwest and the Atlantic Coast has been inaugurated by the arrangement of a new air-rail tie-up by the Chicago and North Western Railway and Mamer Air Transport, with the air-rail transfer point at St. Paul and the Western air terminal at Spokane. Rail transportation from Chicago and Milwaukee to St. Paul is provided over the North Western railway.

The new Spokane-Twin Cities air service is the completing link in the rail-air transportation chain which includes the Chicago and North Western-Kohler Aviation air-rail tie-up, with daily flights across Lake Michigan between Milwaukee and Grand Rapids, Mich. It requires an elapsed time between Spokane, Wash., and New York City of forty-four hours. The schedule time between Chicago and Spokane is twenty-three hours on the eastbound trip.

Planes operate on daylight schedules of eleven hours between Spokane and the Twin Cities. A traveler may board a plane in Spokane at 7:00 a.m. (Pacific Coast Time) and arrive in St. Paul at 8:00 p.m. (Central Standard Time), eleven hours in the air. At St. Paul the passenger boards the North Western Limited leaving St. Paul at 8:40 p.m., arriving in Milwaukee the next morning in time to catch the 6:15 Kohler plane from Milwaukee to Grand Rapids, Mich., where a waiting Michigan Central train takes him on to New York, arriving there at 6:30 o'clock the following morning, forty-four hours, thirty minutes after leaving Spokane.

Westbound, trains and planes make fast connections at the same transfer points, operating on a forty-six-hour and fifty-minute schedule.

The first planes of the recently organized New York, Philadelphia and Washington air passenger line will take off from the Newark and Washington airports on Monday, September 1, inaugurating the first "every hour on the hour" air service in the East.

Daily, the first northbound plane will leave Washington at 8:00 a.m.; the first southbound plane will leave Newark at 8:45 a.m., after its passengers have been brought from New York by bus, leaving Pennsylvania Station at 8:00 a.m.

The New York, Philadelphia and Washington line will operate ten round trips daily between the terminal cities, with a flying time of one hour and fifty minutes. The fare from New York to Washington will be $14.70 one way and $23.75 for the round trip. The fare from New York to Philadelphia will be $5.85, and from Philadelphia to Washington, $8.85. Ten-passenger trimotored Stinson monoplanes will be used on the line.

On August 18th, Eastern Air Transport, Inc., inaugurated an air passenger service between New York, Philadelphia, Baltimore, Washington, and Richmond.

This company, which has operated the New York-Atlanta-Miami air mail route since its beginning, is flying Ford trimotor transports in its passenger service, over the same airway on which its mail planes have flown 3,000,000 miles. The personnel and facilities of its air mail route are being used for its air passenger service.

Since the beginning of its operations, Eastern Air Transport has planned a passenger service that would bring the cities which it serves as closely together for persons as for mail. This beginning on August 18th is planned as the first unit of a complete service that will extend over the entire airway.

In the past year Eastern Air Transport has been working in close coöperation with its associated company, Sperry Gyroscope Company, Inc., in the development of the Sperry Artificial Horizon, the Directional Gyro and the Sperry Gyropilot. The E.A.T. passenger planes will be equipped with these aids to aerial navigation. The Artificial Horizon and Directional Gyro will be installed at once, and arrangements have been made to obtain Gyro pilots as soon as they are available. Eastern Air Transport is the first established airline to use these most modern and valuable aids.

With two exceptions the passenger planes will be operated from the same fields that E.A.T. mail planes use. The two additional fields which the passenger planes will use are North Beach Airport, located less than half an hour by speed boat from the mid-town district of New York City, and Washington Airport, located conveniently to the heart of the national capital.

The Newark Municipal Airport will be used, giving two terminals in the New York Metropolitan Area. This is the northern terminus of Eastern Air Transport's mail route between New York, Atlanta and Miami. The Philadelphia district will be served from Central Airport, Camden, fifteen minutes from the Philadelphia City Hall. At Baltimore the passenger planes will use Logan Field, and at Richmond the Richard E. Byrd Field, the municipal ports of these cities.

The fares are but slightly more than rail-plus-Pullman fares between the cities on the route. To fly the entire distance between New York and Richmond costs $21.50. The fare for the shortest section of the route, between Baltimore and Washington, amounts to $3.50.

In the matter of increased patronage of the airlines there is also an abundance of evidence.

The total number of pounds of mail carried in the air for the month of July 1930 amounted to 693,627, an increase of 12,967 pounds over the total for the month of June, when it was but 680,660. In this connection attention was called by Assistant Postmaster General Glover to the fact that American business men are taking advantage of the great saving in time through the use of the air mail and are employing this method of dispatching their important mail more and more each day.

Passengers carried in July over the transcontinental divisions of the T.A.T.-Maddux Air Lines totaled 2,704 compared with 738 passengers or an increase of 360 per cent over the number carried on the same divisions of the T.A.T. lines in July 1929.

Passengers carried on the entire T.A.T.-Maddux system, including the Pacific Coast divisions, totaled 5,049 last month compared with 3,621 for the entire T.A.T. and Maddux systems last July. Miles flown by the T.A.T.-Maddux planes last month totaled 212,548, with no mechanical interruptions to schedules.

Passengers carried thus far this year on the T.A.T.-Maddux lines total 30,344 and miles flown total 1,463,800.

Although American Airways, Inc., transport subsidiary of The Aviation Corporation, did not equal in July the banner month of June in the number of passengers carried, because of fare revisions effective July 1, revenue increased 8.1 per cent. During July, 6,608 passengers were carried, bringing the total number for the year to 41,657, as compared with 20,659 carried during the entire year of 1929. It is also interesting to note that the number carried by this one system in the single month of July exceeds by 826 the total number of 5,782 passengers carried

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by all the companies in the United States during the entire year 1926.

A graphic illustration of the way business houses of both North and South America are employing the airplane to speed international trade and commerce is contained in traffic reports for the first six months of the year made public by the New York, Rio and Buenos Aires Line, Inc. To July 1st, a total of 5,685 persons were carried by the NYRBA Lines on the regular scheduled operations between North America, the West Indies and South America.

In its first twelve months of operation, West Coast Air Transport planes flew more than 400,000 miles—a distance equal to more than fourteen times around the earth at the equator. Operations have been maintained ninety-seven per cent on schedule, 6,011 passengers having been carried.

Four years' operation of scheduled passenger air services without injury to a passenger was completed recently by Stout Air Lines. During this period the Ford transport planes of the Stout fleet have carried 122,000 passengers and have flown more than 1,250,000 miles. Four round trips daily are scheduled on the Cleveland route and four round trips daily on the Chicago route. Because of the demand for passage, extra sections are frequently operated.

These are only examples which have come to my attention within the last month. Undoubtedly numerous others might be cited, but they would only serve to show the more emphatically that air transportation is unique in these times—it continues to grow.

—ROBERT B. RENFRO

QUALIFICATION for EMPLOYMENT on AIRLINES

By W. H. MACKIE

Personnel Manager, Western Air Express

AIR transportation perhaps offers a more diversified scope of activities than any other field of endeavor in business life. Without doubt that factor contributes a great deal to aviation's widespread appeal to youth throughout the world. Be it business, salesmanship, mechanics or professional pursuit which has especial appeal to a young man—aviation offers a beckoning hand.

The industry's operation division involves an organization similar to that built up around other forms of transportation. Although the industry might be said to be still in its incipiency, the eventual structure has already appeared in outline form in the management of some of the major air transport companies. Usually, the organization is divided into three classifications—operations, traffic and accounting—each, through its head, directly responsible to the administrative executive.

In Western Air Express, for example, the president, Mr. Harris M. Hanshue, is a man of business training who serves in the capacity of general manager, directly responsible to a board of directors for the entire conduct of his company's affairs. Under him are two vice presidents—one in charge of operations, and the other in charge of traffic. The duties of the former have to do with selecting suitable equipment, a force of competent field managers, pilots and mechanics, radio operators and miscellaneous help, installing the service and directing the operation and maintenance of equipment to the best advantage of the company. The vice president in charge of traffic is concerned with organizing a sales force to sell the service offered and with directing a department of public relations through which the service is popularized and complaints adjusted. Also, under the president and general manager is the secretary-treasurer, who has charge of auditing and accounts, and is responsible for all property and all funds of the company.

Directly under the vice president in charge of operations is a superintendent in charge of operations, and under him in turn are divisional superintendents. The field manager serves both as chief dispatcher and shop superintendent, directly supervising operation and maintenance at his station. Recently an engineering department was added to the operations department of our company. Mr. Herbert Hoover, Jr., formerly chief of communications, was appointed chief engineer, with supervision over operation and maintenance of four important departments. They are communications, dissemination of weather information, airports and airways, and aeronautical engineering.

The staff of the traffic department, where conditions warrant, is composed of such sub-executives as the general traffic manager, divisional traffic managers, the general passenger agent, the district passenger agent and a director of publicity, with such assistants as they may require. The duties of these men are similar to those of equivalent sub-executives in railroad organizations. Under the secretary-treasurer is the usual group of auditors, bookkeepers, general office help and stockroom clerks.

The education and training requirements of men engaged in the operation and traffic departments are numerous and varied. Operation and maintenance of airplanes comprise a highly specialized, technical field with training requirements considerably at variance with those of the older, established forms of transportation. Fortunately for the air industry, however, men of higher caliber are seeking employment in this department than in similar work in any other transportation field. Besides their educational qualifications, these men exhibit a high moral and character development.

Those engaged in traffic solicitation or accounting are not required to have the technical knowledge and practical training with airplanes necessary to a satisfactory operating personnel. But everyone connected with airplane transportation should be intelligently well informed on the problems and services of the industry. In our organization most of the traffic representatives are college graduates and, as such, are able to cope much more capably with the diversified questions and problems that come to their attention every day. It is necessary, however, for our traffic men to have had some previous experience in business life before coming with the organization. Of the hundreds of applicants I have interviewed almost all have had some previous contact with the industry. A great amount of this experience dates back to the barnstorming days when men were attracted to aviation more by its romance than by the remunerative aspects of operating an airplane. Now that those days are gone forever, the pioneers wish to engage in the aviation of the future—that which will base its growth in offering the traveling public reliability, economy and speed.

The solicitor of airline traffic must have a basic knowledge of transportation and its place in the economic scheme. He must understand how this particular agency now fits into the general transportation structure. For this reason it is imperative that the traffic representatives, as well as other workers engaged with Western Air Express, be stimulated to further study of aviation by enthusiasm and inquisitiveness.

With the enthusiasm and ambition which is the heritage of youth, the young man is a valuable asset to air transportation. There are many of them in the ranks of Western Air Express. But just as aviation needs energy, it also needs a governor. Consequently, we implant older men in the organization whose wise counsel acts as a steadying hand. The average age of the men employed in our company is thirty years. I hardly believe this could be duplicated in any other line of endeavor in business life. It may account in part for the rapid progress, physically and financially, of air transportation in America.

The youthful beginner in air transportation will find that the compensation will be less than he might secure in other employment. If, however, commercial aviation develops as it promises to, the ultimate destination of any of these men will justify any temporary sacrifice in immediate income. For this reason and to pacify peace of soul, it is clearly evident that the beginner must first decide that the business of transporting persons or goods from point to point will be his life occupation. And with this in mind, if he is to succeed, he must stay with aviation until its growth offers him a position and salary that will justify a temporary sacrifice in income.

Until a few months ago a pilot's berth was considered about the only worth while position in air transportation. This thought was nourished mainly by the false atmosphere of romance surrounding the operation of airplanes. Now, however, a sane public realizes that an airline has a definite

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THE AIR SERVICES

MOFFETT URGES MAXIMUM AIRCRAFT CARRIER TONNAGE

THE aircraft carrier has become such an important unit of the fleet that the United States should build up to the limit of aircraft carrier tonnage allowed by the London naval treaty and should build and equip six-inch-gun cruisers with planes, platforms and other aircraft scouting facilities to the maximum under the terms of the treaty. This is the opinion of Rear Admiral William A. Moffett, Chief of the Bureau of Aeronautics, Navy Department, as expressed last month in an address included in the dedicatory ceremonies of James Clements' Field, Bay City, Mich.

"There is nothing more important in national defense today than the building up to the limit of the aircraft carrier tonnage allowed by the treaty, namely, four 13,800-ton carriers," Admiral Moffett said. "The purpose of every combatant surface vessel is to carry into action the maximum number of effective weapons. A battleship carries from eight to twelve guns of major calibre. The carrier limit is the number of airplanes it operates."

The Bureau of Aeronautics has estimated that an additional 1,000 airplanes will be needed to comply with the terms of the London treaty, according to Admiral Moffett. This means, he said, that an additional Five-Year Building Program must be authorized by Congress.

The United States had the right to build 69,000 tons of aircraft carriers since the signing of the Washington treaty in 1922 and has not used a ton of this amount. One 13,800-ton cruiser has been authorized by Congress.

The London treaty contains the same provisions in regard to aircraft carriers as the Washington treaty, allowing 135,000 tons for Great Britain and the United States and 81,000 tons for Japan, a ratio of five to three, but prohibits the building of aircraft carriers of 10,000 tons or less, unless they are charged to the aircraft carrier tonnage. There is a new provision, however, to the London treaty which permits the placing of landing decks on twenty-five per cent of the total cruiser tonnage. This means that landing decks for aircraft can be placed on about 80,000 tons of cruiser tonnage for the United States and Great Britain and 48,000 for Japan.

The United States has 73,000 tons of cruiser tonnage available under the terms of the London naval treaty in addition to the six-inch-gun cruisers and the eight-inch-gun cruisers provided for in the treaty. This tonnage can be most efficiently used by building 10,000-ton six-inch-gun cruisers and equipping them with landing decks and aircraft.

The use of catapaults for launching planes is disadvantageous, present cruisers carry catapults and from two to four planes which cannot be recovered after launching them without stopping the ship and unless weather conditions are favorable. The use of landing decks instead of catapaults permits planes to take off and return without forcing the ship to stop, regardless of weather conditions. In addition, a greater number of planes can be carried.

A six-inch cruiser equipped with aircraft with a range of 200 miles and provided with landing platforms is greatly increased in value and would be equal to the eight-inch-gun ship without landing decks and aircraft.

At present the Navy has three aircraft carriers in operation in the fleet; the *Langley, Lexington* and the *Saratoga*. Aircraft are carried on thirty-four other combatant ships of the Navy. More than 900 modern airplanes designed for every purpose are in commission.

Capt. Page Completes Blind Flight of 1,000 Miles Cross Country

A "BLIND" flight of 1,000 miles guided by flight instruments alone was completed recently by Capt. Arthur Page of the Marine Corps. Inclosed in a hooded cockpit, Capt. Page took off at Omaha, Neb., in a Standard Navy Observation plane and landed at the Anacostia Naval Air Station, Washington, D. C., approximately thirteen hours later, making stops en route for refueling at Chicago and Cleveland.

Captain Page was accompanied by Lieut. V. M. Guyman of the Marine Corps, copilot. The course was laid over radio-controlled airways. When landings were made, Captain Page piloted the plane to a point about 200 feet from the ground when the controls were taken over by Lieutenant Guyman.

The flight was included in the research which Captain Page is conducting on blind landings, representing the Bureau of Aeronautics and working with the Bureau of Standards. The experiments on "blind" flight being conducted by the Navy Department and the Bureau of Standards were described in the August issue of AERO DIGEST.

Instrument Flying in Advanced Flying School Curriculum

A COURSE in "Instrument Flying," in which the student learns to pilot an airplane through the air with the aid of instruments alone has been added to the curriculum of the Advanced Flying School of the Army Air Corps at Kelly Field, San Antonio, Texas.

Several Primary Training planes, each with the rear cockpit equipped with an airspeed indicator, altimeter, turn-and-bank indicator, tachometer and compass, and hooded over with an adjustable canvas hood, are used for the first phases of this instruction. Eight hours are devoted to practice in this type of flying, the student being seated in the hooded cockpit and the instructor in the open one.

QUALIFICATION as Naval Aviators of nine Naval officers who received instruction in lighter-than-air at the Lakehurst Naval Air Station, Lakehurst, N. J., during the past year was announced recently by the War Department.

They are: Comdrs. Fred T. Berry and Alger H. Dresel; Capt. Harry Shoemaker; and Lieuts. James A. Greenwald, Thomas M. Whelan, Morgan Redfield, Charles W. Roland, Harold H. Pickens, Wilfred Bushnell and Clinton S. Rounds.

THE gunnery trophy for attaining the highest merit in aircraft gunnery in the fighting and dive bombing class was recently awarded to the U. S. Naval Fighting Plane Squadron-Five of the Aircraft Squadrons, Battle Fleet. No other squadron in this class attained a merit within ninety-five per cent of this squadron, which also attained the highest scores with fixed machine guns and light bombs. As a result, twenty-one men of the squadron will receive prize money.

The squadron is commanded by Lieut.-Comdr. J. H. Campman, U. S. Navy, Naval Aviator, and during the past year has been basing on board the Aircraft Carrier *Lexington.*

THE 15th Observation Squadron, commanded by Capt. Wolcott P. Hayes, Air Corps, and the 5th Photo Section, commanded by Captain William D. Wheeler, Air Corps, recently moved from Selfridge Field, Mt. Clemens, Mich., to Scott Field, Belleville, Ill., with their entire equipment.

SAFETY INCREASES IN NAVAL AVIATION

MORE hours and miles with fewer fatalities were flown by planes of the Navy Department during the fiscal year 1930 which ended June 30, 1930, than any year in the history of Naval Aviation, according to a recent announcement of Lieut. S. C. Ring of the Statistical Section of the Flight Division, Bureau of Aeronautics. The figures on naval aviation during the fiscal year 1930, which are approximate, are as follows: Total flying time, 260,000 hours; flying hours per fatality, 14,500; flying hours per fatal accident, 18,150 hours; miles flown per fatal accident, 1,270,500 miles; and miles flown per fatality, 1,015,000 miles.

During the fiscal year 1929 a total of 203,000 hours was flown; the hours flown per fatality were 6,773; and the miles per fatality were 11,289. Therefore, regardless

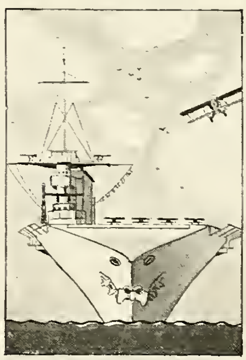
(*Continued on next page*)

When they catapult "CORSAIRS" at sea

In the Navy, "Corsairs" are catapulted from battleships, accelerating from rest to flying speed in a matter of split seconds. They are landed in all kinds of seas and picked up by cranes. As landplanes they take off from the decks of aircraft carriers and land into arresting gear. Such use sets up strains far greater than those met by airplanes in any other service.

For experienced airmen the appeal of the Vought "Corsair" is based on the extreme ruggedness of design which underlies its beauty. This is not merely a well designed ship with superb performance in the air and unusual ability to get into and out of small fields. The "Corsair" is built to stand up in constant use under the most severe operating conditions.

Private owners find keen satisfaction in the distinctive qualities of the "Corsair" which have earned the ship its enviable operating records in the service of the Navy and Marine Corps. CHANCE VOUGHT CORPORATION. Division of United Aircraft & Transport Corporation, East Hartford, Connecticut.

CHANCE VOUGHT  CORPORATION

(*Continued from preceding page*)

of the increase in total hours flown during the year just ended, the figures show an approximate increase of safety in aerial operations of 100 per cent over the previous year.

HOW AIR CORPS PLANES ARE DESIGNATED

ARMY Air Corps airplanes are divided into eight classes, according to type or model instead of their commercial names. The model designation of planes of the Air Corps is as follows:

Pursuit (fighting planes)	P
Observation planes	O
Attack (ground straffing) planes	A
Transport, Cargo, Ambulance, Workshop planes	C
Bombardment planes	B
Primary Training planes	PT
Basic Training planes, used in transition from primary type to service type planes	BT
Photographic planes	F

Airplanes on experimental and service test status are prefixed by the letters "X" and "Y." Thus, a Pursuit type developed either at a factory or at the Air Corps Materiel Division, Wright Field, Dayton, Ohio., would be labelled "XP," followed by a number which would classify it according to its style, such as "XP-6" which was the experimental stage of a Pursuit plane made by the Curtiss Company somewhat on the style of the Curtiss "Hawk." If this experimental model proves to be of an acceptable type, a small lot is then bought and sent to some active station for service test; that is, they are used with other Pursuit machines to test their serviceability and desirability. Such experimental planes would then be labelled "YP-6."

There are some airplanes in the service which are known by an earlier system of model designation, such as the DH-DeHavilland and the PW-Pursuit water-cooled, but these are either obsolete or obsolescent.

Student Training for Aviation Naval Reserve Officers

STUDENT elimination training for Aviation Naval Reserve Officers is conducted at the four major Naval Reserve Aviation Bases located at Squantum, Mass.; Great Lakes, Chicago, Ill.; Valley Stream, Long Island; and Sand Point, Seattle, Washington.

In addition to these four Bases, Naval Reserve Air Units are maintained at the Naval Aircraft Factory, Philadelphia, Pa.; Naval Air Station, Anacostia, D. C.; the Scouting Fleet Air Base, Naval Air Station, Hampton Roads, Va.; Naval Air Station, Pensacola, Fla.; Naval Reserve Aviation Base, Detroit, Mich.; Naval Reserve Aviation Base, Minneapolis, Minn.; Naval Reserve Aviation Base, Oakland, Calif.; and Naval Reserve Aviation Base, Long Beach, Calif. Marine Corps Reserve Aviation Units are maintained at the Headquarters of the East Coast Expeditionary Force at the Naval Air Station, San Diego, Calif. At these bases, Reserve Naval Aviators may maintain their proficiency throughout the year.

During the present year two new Naval Reserve Aviation Bases will be established; one at St. Louis, Mo., and the other at Miami, Fla.

Two hundred college graduates chosen this year throughout the country for training as Naval and Marine Corps Aviation Reserve pilots receive their preliminary flight training, fifty at each of the following bases: Squantum, Great Lakes, Valley Stream and Seattle (Sand Point). The first groups of ten started June 15 and the last groups will start September 6. Courses require thirty days to complete and include fifteen hours of dual flying instruction.

EIGHTY-SIX of the 235 Cadets who were graduated from the United States Military Academy, at West Point, June 12, and were on that date appointed 2nd lieutenants in the Regular Army, have been detailed to the Army Air Corps for flight training, according to a recent announcement of the War Department.

Forty of these graduates will be trained at the Primary Flying School, March Field, Riverside, Calif. No West Point graduates are commissioned in the Air Corps until they graduate from the Advanced Flying School, Kelly Field, and are rated as Airplane Pilots.

Last year, out of a graduating class of 297 Cadets from the academy, 101 were detailed to the Air Corps for flight training.

Revised Curriculum at the Air Corps Technical School is Announced

CHANGES recently effected in the curriculum at the Air Corps Technical School, Chanute Field, Rantoul, Ill., include the consolidation of the courses in engine mechanics, airplane mechanics and crew chiefs into a single nine-months' course known as "Airplane Mechanics." The new course will cover the essentials of all three courses previously given.

Other changes in the Department of Mechanics include the separation of the Armament Division from the Department of Mechanics; the division of the course in General Mechanics-Aircraft Welders, covering machine shop practice and welding, into two distinct courses, one known as Aircraft Machinists and the other, Aircraft Welders.

The Parachute Riggers' course remains unchanged except that the output will be doubled. A new class of ten men will start in this course every month, with the exception of August and February. Previously classes started every other month.

As a result of the various changes made in the school, the yearly student output will be raised from about 440 to 550 in the Department of Mechanics alone.

DEVELOPMENT OF BOLLING FIELD

FOLLOWING the purchase of a 345-acre tract of land immediately south of Bolling Field, Washington, D. C., from the Washington Steel and Ordnance Company, plans for the enlargement of the field, calling for the acquisition of about 480 additional acres, have been made.

When the ground has been acquired steps will be taken by the Quartermaster General to proceed with plans for the construction of buildings at the field, authorized by Congress and extending over the fiscal years of 1930, 1931, and 1932. All these buildings will be erected on the eastern side of newly acquired property.

These projects include construction of Air Corps technical buildings and buildings for personnel and equipment. Funds for the construction of some of these buildings are provided for in the Army Appropriation Act for 1929 as follows: barracks, \$240,000; administration building, \$42,000; and a warehouse, \$38,000. The technical buildings authorization program for the fiscal year 1930, approved by Congress, but not yet appropriated for, includes hangars, a gas and oil storage building, and a paint and oil warehouse.

The approved program for 1931 for technical buildings, for which appropriations have not yet been made, covers cost of the construction of hangars, field shops, field warehouses, headquarters and operation building, photographic and parachute buildings, gas and oil storage, and grading landing field and technical buildings area.

The 1932 project for housing, which has been approved but not yet appropriated for, includes additional barracks, officers' quarters, warehouses, maintenance building and a garage, firehouse, guard house, post exchange building, theatre and gymnasium, dispensary, railroad spur, and incinerator.

Air Corps Test Chamber at Wright Field

TESTS of aeronautical equipment under low pressure and low temperature are conducted by the Materiel Division of the Army Air Corps, Wright Field, Dayton, Ohio, in a cylindrical chamber which has been installed at the field. The apparatus is that which was used in the School of Aviation Medicine at Mitchel Field, L. I., to test the effect of low pressure on pilots.

The test chamber is cylindrical in shape with an interior height of nine feet nine and one-half inches, and an inside diameter of eight feet eleven inches. The chamber is constructed of boiler plate three-fourths of an inch thick and covered with a layer of cork eight inches thick. The cork is covered with tar and is air-tight. The inside of the walls are surrounded by two rows of refrigerating coils. The temperature is controlled by means of four expansion valves, two of which are located inside the chamber and two of which are placed on the outside. One vacuum valve is located on the inside and one on the outside for extracting the air from the chamber. The air is restored by means of air pressure valves.

An air pressure equal to that at an altitude of 50,000 feet can be established in the chamber within a period of fifty minutes. A temperature as low as fifty-eight degrees Fahrenheit has been produced in the cylinder.

This test chamber is used by the Materiel Division of the Army Air Corps as a low pressure and low temperature chamber for testing oxygen apparatus, flight instruments, goggles, oils, high altitude flying clothes and camera equipment for aerial photography.

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By J. B. Johnston, M. E.

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TECHNICAL

DESIGN of LOW-PRICED AIRPLANES

By Dwight Huntington

OF the three essential requirements of a small commercial or private plane—utility, safety and economy—the latter probably deserves the most attention on the part of designers at the present time.

Safety has been stressed in publicity through the mediums of weather forecasting and licensed planes and pilots, until there are many more air-minded people than there are air travelers. This fact is especially true in regard to private owner-pilots, to whom the apparently limited utility of the airplane stands in striking contrast to its high first, operating and maintenance costs. Once the Commerce Department requirements have been met, increased safety becomes principally a matter of decreased landing speeds.

Increased utility, however, is a problem largely beyond the jurisdiction of designers of private planes because of weather hazards and the inconvenient locations of practically all airports. So great are these handicaps that most of the private flying being done is for pleasure rather than for business purposes, which fact is evident to the casual visitor at almost any airport. The efforts of designers to increase utility generally result in slightly higher cruising speeds, which improvement is of negligible value until much higher speeds are obtainable. Furthermore, the slight advantage of increased cruising speed is too often obviated by decreased safety and increased cost resulting from higher landing speed and the addition of wheel brakes. I remember several instances of quick trips ending in too quick landings and minor crack-ups which caused more time to be lost in getting back than was saved in going over.

Economy is certainly the most important consideration in private plane design, the prime basis of manufacturing competition and therefore worthy of more serious study in all of its phases. Because the largest number of prospective purchasers must be recruited from the ranks of young men of very limited means, a low price tag will for some years be the most formidable sales argument. Thus low prices are of more importance, relatively speaking, to the airplane industry than to the automobile industry.

To strive for a low first cost primarily means to eliminate expensive hull or pontoon construction and concentrate on a land type plane. A moderately powered engine selling at a reasonable price, a minimum number of accessories, inexpensive materials and simplicity of construction follow as matters of course. Accessories particularly should be carefully scrutinized. Dural props, starters, extra flight instruments, brakes, tail wheels, oil shock absorbers and similar additions are advantageous, but only to those who can afford them. Yet because of such equipment many otherwise saleable planes have been hoisted beyond the financial reach of prospective purchasers, and thus several manufacturers of meritorious basic products have been engineered into sheriffs' offices. It is only too easy to double the selling price of a plane by the addition of special equipment. It is surprising, therefore, that more manufacturers do not concentrate sales efforts on low-priced "Standard" jobs, while holding fully-equipped "Sports" or "De Luxe" models in the background, but nevertheless available.

Particularly, the designer may greatly improve his product with regard to ease of operation, thereby reducing flight instruction expenses which are intimately related to first cost. A reduction here will also stress the safety of the plane to the prospective purchaser.

Another example of price zooming and sales stalling is to be found in a too-early effort to beautify planes beyond sales requirements. Many supposedly low-priced planes incorporate pleasing contours on the fuselages, wings and tail surfaces, whereas some large commercial transports and military jobs, on which lines of great aerodynamic efficiency appear to justify the higher cost, carry straight lines throughout. Beautification is to be commended except in instances which place a useful article just beyond the reach of many people. There appears to be little logic in this dolling-up of ships for prospective purchasers, the majority of whom only yearn for a simple something they can afford. From the standpoints of both manufacturer and user, "another airplane" in the hands of the latter is of far greater importance than a primed beauty on the hands of the former—"all dressed up, etc."

Economy of operation and maintenance also are worthy of drastic reductions by manufacturers. The former will be largely taken care of by a decrease in engine horsepower, either as a result of further aerodynamic refinement or a decrease in performance—particularly in speed—with accompanying fuel and oil economies. Insurance, a sizable item, will decrease with first cost. Durability is a matter of decreased engine speeds, selected materials and good workmanship. In this computation, the cost of recovering the plane two or more times during its life, assuming it is cloth-covered, should be included. This item, $500 or more, probably will do much to bring all-dural jobs into vogue. In the matter of hangar rent, in view of the increasing popularity of rating ships by spans or areas, the advantages of folding wings are brought forcibly to the designer's attention. A saving of two-thirds of the rent, or say $20 per month, over a life span of five years, is worthy of consideration if competition is to be squarely met. A folding wing arrangement, such as was probably first used on the English Westland "Widgeon," should not add more than $50 to the production cost of a plane, and in view of the saving in rent made possible, is clearly justified.

Another feasible scheme for price reduction—one that may presently assume first importance—exists in coördinating the designs of related models. For although aeronautical engineering is comparable to marine engineering in regard to the multiplicity of model variations, several models of small passenger planes are so closely related as to be worthy of consideration so far as standardization of several units is concerned. In this direction lies low cost production, as has long since been proved by the automobile industry.

At the present time numerous companies are producing three or more models ranging from two to four passengers and having few, if any, parts common to all. Several of these companies market open biplanes and closed monoplanes having no similarity of lines, thereby nullifying individuality in design of their products—the best possible trade-mark.

In order better to understand the trends in private and small commercial plane design, an analysis of planes of U. S. manufacture is included here, in the preparation of which an effort has been made to include all ships of each model that are purchasable at the present time to the exclusion of purely experimental and obsolete planes. This procedure necessarily brings numerous very small producers alongside of the larger ones and does not indicate the market trend so far as the sale of each particular model is concerned.

It is assumed that, before planning a new plane, a manufacturer will thoroughly investigate the demand and supply for that particular model. This procedure may prove his original preference to be faulty and enable him to make a profit on a second choice instead of suffering a loss on the first. Too often, perhaps, the airplane manufacturer has relied for his choice of models on the supposedly clever hunch of a designer, pilot or promoter who has merely conceived of a slightly new variation of the seven requisite units which comprise the landplane.

The following table includes the 100 landplanes of eight types manufactured in the United States at the present time. Power ratings range from 30 to 425 horsepower. Powered gliders and solo pleasure planes

are not included, since it is believed these models are not worthy of consideration from the viewpoint of standardization because of their small disposable loads.

The one tandem two-passenger closed plane on the market is included under the tandem two-passenger open model, since, as a rule, the latter is convertible to the former. The limited vision from the rear seat in a closed plane is apt to prevent that particular model from attaining any great degree of popularity. Sesquiplanes are included under biplanes.

Model	Bi-planes	Mono-planes	Total
OPEN TYPES			
Club—2 POL (Tandem)......	26	13	39
Airster—2 POL (Side)........	1	4	5
Universal—3 POL (2-1).......	20	3	23
Tourister—4 POL	0	0	0
Express—1 POL (Cargo)......	5	3	8
	—	—	—
Total—(Open)	52	23	75
Percentage of Total......	69.3%	30.7%	—
CLOSED TYPES			
Coupe—2 PCL (Side).........	0	7	7
Cab—3 PCL (1-2)............	1	3	4
Coacb—4 PCL	1	13	14
	—	—	—
Totals—(Closed)	2	23	25
Percentage of Total......	8%	92%	—
Grand Totals..................	54	46	100

With the open and closed models grouped separately, the designers' preferences for open biplanes and closed monoplanes are evident. Department of Commerce figures (A.C. Bulletin Volume 1, No. 5—September 2, 1929) also indicate that although open biplanes outsell closed monoplanes, there is a decided trend of design in the latter direction. The reasons for this probably exist in the fact that all-weather planes are more necessary than closed cars because of the immediate effects of altitude, and the monoplane type is favored because of its inherent advantages of lower cost, because it requires fewer parts, has better visibility, needs less rigging and makes simpler the folding wing arrangement.

Probably the best sellers at present are the Universal and Club models, with the Coupe, Cab and Coach models contending for third place. Inasmuch as the Universal and Cab models owe their existence to the Curtiss OX-5 engine, three passengers being considered the safe limit for that powerplant, these two models are practically certain to be displaced by the Tourister and Coach types with lighter or more powerful engines and eventually to pass completely out of the picture.

If, then, we eliminate the Universal and Cab models from future consideration, we find six related models remaining—Coach, Coupe, Tourister, Airster, Club and Express. It is evident that of these the Coach and Club models will be the heaviest and lightest respectively, assuming similar power plants. The disposable loads will compare approximately as follows:

Items	Coach (4 PCLM)	Club (2 POLM)
Passengers @ 170 lbs.....	680 lbs.	340 lbs.
Baggage @ 20 lbs./pass...	80 lbs.	40 lbs.
Fuel, 35 gals. @ 6 lbs.......	210 lbs.	210 lbs.
Oil, 4 gals. @ 7.5 lbs.......	30 lbs.	30 lbs.
Disposable Loads	1,000 lbs.	620 lbs.

Disposable loads of the other four models will fall between these two.

The problem now becomes a matter of compromising the six models with respect to weights, power and dimensions, so as to secure the maximum number of interchangeable parts and units for all.

Obviously, the Coach model, being the heaviest, will be the master or basic design; and the weight estimate should include full equipment, such as dural prop, starter, battery and lights, additional instruments, brake wheels, tail wheel, oil or pneumatic shock struts and, possibly, crashproof tanks and tip flares that would be included with the De Luxe model. This procedure would greatly simplify the A.T.C. problem, since the stress analysis for the De Luxe Coach would not only apply to the Standard Coach of, say, 100 pounds less gross weight, but all parts or units used in the Coach would be applicable to the other, lighter models so far as stress requirements were concerned.

Moreover, I venture the predication (having designed the first Coach monoplane in 1926) that this model is destined soon to take first place in plane sales because it provides the maximum utility for the money. Body resistance will not decrease Coach performance below that of two-passenger side seating models, for the latter require the same frontal area.

Powerplant selection should largely be governed by power required, price and availability. Assuming similar engines for all models, the logical choice becomes one of the minimum horsepower required for the De Luxe Coach, in order that the models of smaller capacities will not be excessively and uneconomically powered. Let us assume an engine of 120 horsepower and a net weight of 1,400 pounds—a tight figure but one obtainable by careful design—making a gross weight of 2,400 pounds for this model.

Hereafter two avenues of development are available to the designer. He must choose between increased performance and decreased dimensions for the smaller capacity models, on the one hand, and the minimum cost for all, through the maximum standardization of units, on the other.

In the first instance—that of partial standardization of wing units—several combinations are available which permit reductions in the weights, areas, and spans of the two-passenger models. Two typical illustrations are shown. Figure 1 pictures a strut braced biplane, the small lower wing being either of cantilever or braced construction, as indicated by the dotted lines. This lower wing would be applicable only to the large models.

Figure 2 shows the addition of a center section, triangular stub wings and their brace struts which likewise can be omitted in the two-passenger models. Thus the main panels and lift struts can be standardized on all jobs, and the wings may be readily folded as well. One evident disadvantage of these and similar designs exists in the dissimilarity in lines of related models.

Next let us consider the ideal low cost condition—standardization of the complete wing unit. In this case all models would present similar front elevations, possibly as shown by the conventional monoplane, Figure 3. Spans would be approximately the same for all, being slightly smaller for the Club model with its narrower body. Areas likewise would be nearly equal, depending upon the designer's handling of the center section and trailing edge cutouts on the open models.

Let us assume that four complete units—powerplant, wings, undercarriage and empennage—are standardized for all models, and that the slight variations in control units will not materially affect their relative weights. Differences in the net weights of the several models will then result from changes in fuselages and in furnishings and equipment. Here a prelimi-

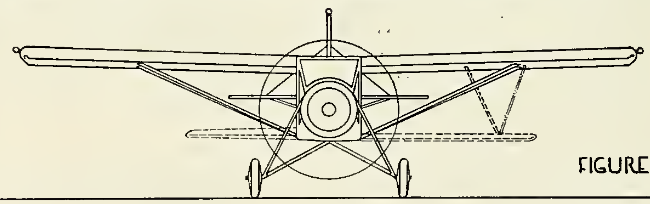


FIGURE-1

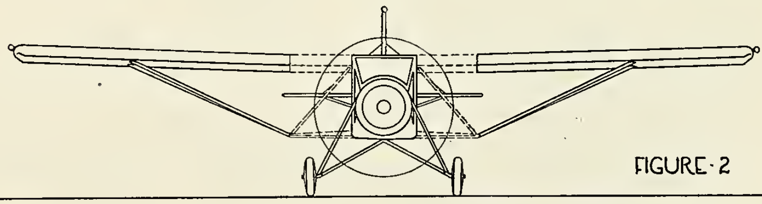


FIGURE-2

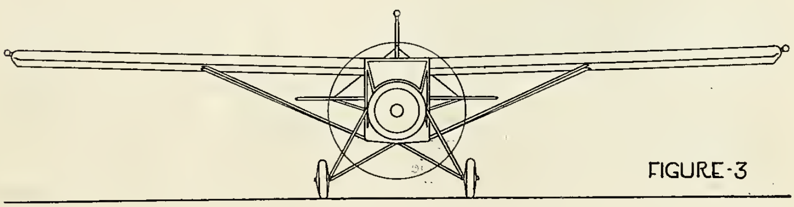


FIGURE-3

nary estimate of the principal characteristics of the two extreme models is in order. Inasmuch as a downward revision of surface loadings on private planes appears imminent, sufficient area has been assumed to keep the landing speed of the Coach on the lee side of 50 miles per hour.

	COACH (4 PCLM)	CLUB (2 POLM)
Disposable load	1000 lbs.	620 lbs.
Net weight ..	1400 lbs.	1280 lbs.
Gross weight	2400 lbs.	1900 lbs.
Power	120 h.p.	120 h.p.
Power loading	20 lbs. per h.p.	15.83 lbs. per h.p
Area	267 sq. ft.	267 sq. ft.
Wing loading	9 lbs. per sq. ft.	7.12 lbs. per sq. ft.

It is clear that an area of 267 square feet will require a span of approximately 44 feet and a chord of 6 feet 8 inches, which means that the three heaviest models would be of average size and the three two-passenger jobs larger than the present average.

The first reaction to these figures is apt to be that the Coach would be under-powered and of poor performance, if not actually unsafe, while the two-passenger models would be excessively large and heavy and, perhaps, overpowered from the viewpoint of economical operation.

In the case of the Coach, however, if the cruising speed is kept in the vicinity of 75 miles per hour, an ample power reserve in obtainable and there need be no sacrifice in safety, though the speed range probably will not go far above two. This performance would not compare very favorably with many of the high-powered jobs of today, yet it does appear sufficient for all purposes of economical pleasure flying. The present need is decreased cost—not increased performance.

Similarly the two-passenger jobs, although no larger than several two-seaters on the market today, admittedly will appear cumbersome when compared with many of the small, snappy-appearing models now available. Yet, if the former offer the prospective purchaser decreased landing speeds, equal high speeds, higher ceilings, and more rugged construction—at greatly reduced prices—the classy, specialized, custom-built jobs will be headed toward the shelves.

Figure 4 suggests the side elevations of a line of six related models.

Summarizing, it is evident that power plants may be standardized with minor alterations in fuel lines and engine control. Changes in propellers will be necessary in those cases in which wood ones are used.

Furnishings and equipment can be interchangeable for the most part, with variations of a trivial nature.

Wing units may be identical with the exception of the folding flaps, two types of the latter being necessary, one to permit access to the rear cockpits of three of the models. A ready means for varying the incidence of the wing on assembly, to suit the performance of the particular model, is an obvious necessity.

Undercarriages may be completely standardized, including the tail support. Oversize tires on the three larger models may be advisable. Empennage units likewise can be standardized without change or all models.

Controls will vary principally in that two different assemblies of stick or wheel units will be required, together with minor changes in operating members. Each part, however, may be standard at least for several models.

The largest variations will be in the fuselages, yet even here it should easily be possible to construct the Coach and Coupe models on one jig, the Tourister, Airster and Express models on another and the Club model on a third. Here, again, many parts, such as fire walls, seat frames and seats, floors, fittings and numerous struts, may be standard for several models.

Thus it is evident that through standardization the manufacturer of several related models can materially reduce production costs. For the smaller manufacturer, too, making his modest bid with a single experimental model, the plan has possibilities. A little more time and money spent in engineering a group of models will enable him to add others to his line-up whenever circumstances warrant, on short notice and with a much smaller capital investment than under the present scheme.

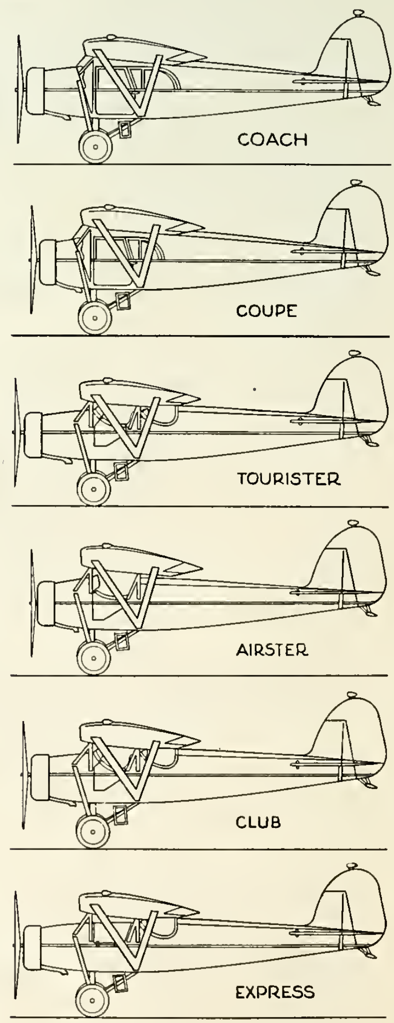


Fig. 4. Side views of 6 related models

Anyone with a fair knowledge of mathematics, aerodynamics and mechanics can design an airplane that will fly moderately well and safely. Ability of a more practical sort is required, however, in designing a thoroughly satisfactory plane that can be produced at a saleable figure. Designers should not lose sight of the fact that a low price ceiling is of far greater importance to the industry than a high flight ceiling, and that making a plane structurally sound is but the prelude to the larger problem of making it sound from an economic standpoint. Big business is largely mass-selling and frequently results from a single appeal—to pocketbook preference.

STRENGTH OF WELDED JOINTS IN TUBULAR MEMBERS FOR AIRCRAFT

THE investigation described in N.A.C.A. Report 348, by H. L. Whittemore and W. C. Brueggeman, was made by the Bureau of Standards in coöperation with the National Advisory Committee for Aeronautics for the Aeronautics Branch, Department of Commerce. The object of the investigation is to make available to the aircraft industry authoritative information on the strength, weight and cost of a number of types of welded joints. This information will also assist the Aeronautics Branch in its work of licensing aircraft by providing data from which the strength of a given joint may be estimated.

Following the program prepared from information supplied by manufacturers, forty joints were welded under procedure specifications and tested to determine their strengths.

Report 348 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

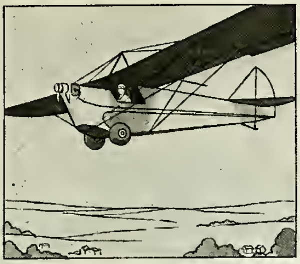
EFFECT OF VARIATION OF CHORD AND SPAN OF AILERONS ON ROLLING AND YAWING MOMENTS

NATIONAL Advisory. Committee for Aeronautics Report 343, by R. H. Heald, D. H. Strother and B. H. Monish, presents the results of an extension to higher angles of attack of the investigation described in Reference 1, of the rolling and yawing moments due to ailerons of various chords and spans on two airfoils having the Clark Y and U.S.A. 27 wing sections.

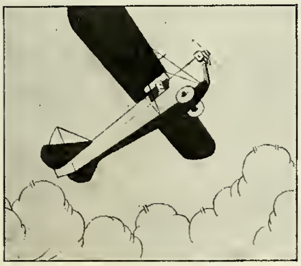
The measurements were made at various angles of pitch but at zero angle of roll and yaw, the wing chord being set at an angle of plus four degrees to the fuselage axis. In the case of the Clark Y airfoil, the measurements have been extended to a pitch angle of 40 degrees, using ailerons of span equal to 67 per cent of the wing semispan and chord equal to 20 and 30 per cent of the wing chord.

The work was conducted in the ten-foot wind tunnel of the Bureau of Standards on wing models of sixty-inch span and ten-inch chord.

Report 343 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.



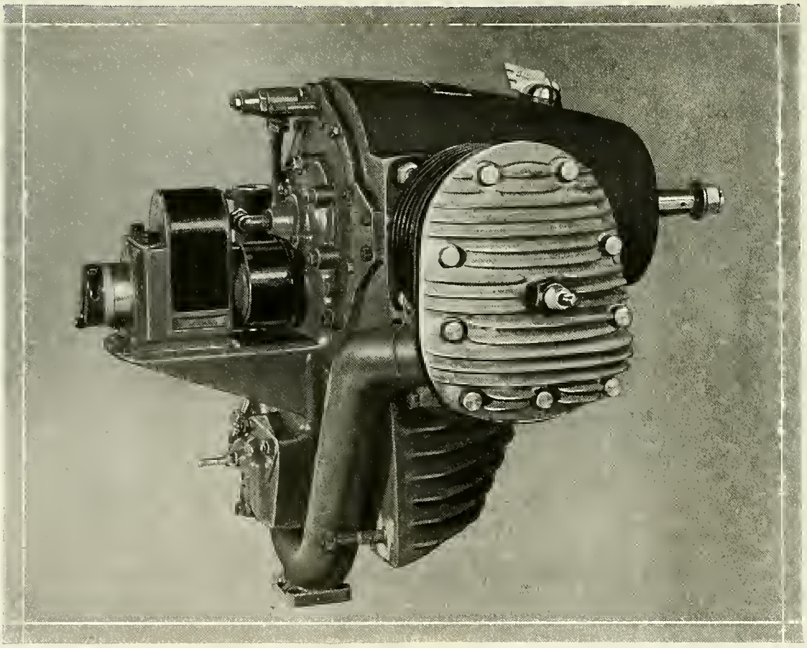
ENDURANCE—Recently Stanley C. Huffman kept his fifteen hundred dollar AERONCA up for twenty-six hours . . . nearly nineteen hundred miles.



ALTITUDE—AERONCAS have already passed the best previous light plane records by more than 3000 feet . . . and each week sees one going a little higher.

RELIABILITY — From ocean to ocean in a standard AERONCA . . . across swamps, deserts and mountains . . . over the Sierra Nevada range at 13,000 feet . . . without a falter.

ECONOMY—Two gallons each hour . . . at 65 miles per hour . . . 35 miles to the gallon . . . from Chicago to Detroit for $2.00.



We tried them all « « then built our own

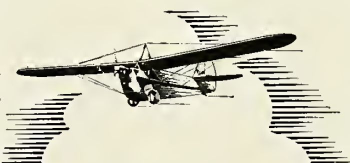
The Aeronca C-2 has gotten a solid foothold in pioneering a truly practical and economical light airplane. Government figures prove conclusively that sales and production on this plane are ahead of any other, regardless of make—and government figures are more reliable than advertising and publicity claims.

As soon as the Aeronca solved the dilemma of designing and building a light airplane—an airplane that was actually **safe** in the hands of a novice—it also precipitated an epidemic of contraptions with wings, gliders with auxiliary motors and various other freak devices, designed primarily to capitalize on the extraordinary interest aroused by the performance of our plane. Frankly, we are both glad and distressed by this turn of events . . . glad, because comparison will increase our own sales . . . and distressed because faulty engineering in hastily designed planes may result in fatalities harmful to the whole industry. As far as competition is concerned . . . we welcome it with outstretched arms because there is a real market for a dozen **safe** types of economical light airplanes.

The safety of an airplane depends on design and engineering: we spent five years and a quarter million dollars to attain it. Economy is another problem entirely. While there are many motors that will operate on two gallons an hour . . there was none that we could use to give our plane the performance it now has. Those that were economical enough were not there when it came to horsepower. Those that had the horsepower were too heavy and too costly to operate. As a result we have the Aeronca E 107 A—our own motor.

The efficiency of this engine is remarkable. It consumes approximately two gallons of gasoline an hour which, at cruising speed, means about 35 miles to the gallon. The compensating parts are of the very finest materials and **all bearings are either ball or roller type.** It develops 30 horsepower at 2500 R. P. M. at a compression ratio far lower than that of any airplane engine made. It is so rugged in construction and so absolutely reliable in its performance that pilots do not hesitate to fly behind it over country that represents potential disaster in event of failure. It is so foolproof in its performance that several records —altitude, distance, endurance—have been far surpassed.

In short, the Aeronca E 107 A motor has made of the Aeronca an airplane that will step out with the best of them, go wherever they go, do whatever they do . . . and have enough reserve on hand to show a few unprecedented tricks of its own. That, essentially represents the difference between a so-called power glider and a **real** airplane of the Aeronca type. We'll gladly tell you more upon request.



THE AERONAUTICAL CORPORATION OF AMERICA

LUNKEN AIRPORT · · · CINCINNATI, OHIO

AMERICAN EAGLET MONOPLANE

THE American Eaglet, a featherweight airplane, recently completed its flight tests at Fairfax Airport, Kansas City. The plane, a parasol type monoplane which when powered with a two-cylinder Cleone engine of 25 horsepower carries one person or when fitted with a Szekeley three-cylinder 35-horsepower engine carries two persons, has been placed in production at the American Eagle factory. The present production schedule is five planes daily. The American Eaglet will sell for $995 with the Cleone powerplant, and $1,395 with the Szekeley engine.

The American Eaglet light monoplane in flight

Powered with the Cleone engine, the American Eaglet has a speed of approximately 60 miles an hour. Its gliding angle is approximately 12 to 1; that is, the plane descends 100 feet for every 1,200 feet of distance in a non-stall glide.

This light plane is conventional in construction and appearance. The ship is equipped with a conventional type landing gear with Airwheels, which gives it the appearance of a full-size plane when in the air.

An adaptation of the N.A.C.A. wing curve is used. The wings are conventional in construction. Ribs, both web and compression, are built up of spruce and plywood. To give the leading edge greater firmness, auxiliary ribs protrude from the front spar. When the fabric is doped, this arrangement gives the leading edge a tautness virtually as drum tight as would a solid underlayer.

The fuselage is well streamlined. The lower longerons are brought together as a single member midway between the tail group and the nose. The fuselage, which is 23 inches wide, is constructed of steel tubing, as are the members of the tail group also. A door, the width of which is equal to the depth of the cockpit, permits access to the pilot seat. A comfortable aluminum seat is provided. It is fitted with an instantaneous-action safety belt.

Controls are conventional. A rubber gripped steel tubing stick and steel tubing rudder bar are used. The rudder pedals are fitted with heel wells.

Cables running over pulleys are used for control connections throughout. The aileron cable comes down over two auxiliary pulleys at either side of the forward section of the cockpit.

The wing is attached to the fuselage by means of two sets of cabane V-struts, with an additional tubing brace extending diagonally from the upper forward fitting to the lower rear fittings on either side. Two wing struts extend obliquely down on each side to the lower longerons. Additional external bracing is provided by two jury struts, tying into the wing structure.

The landing gear is a conventional rigid inverted V type. It is equipped with 7-by-16-inch Airwheels on four-inch hubs. The landing gear is diagonally braced to provide further strength. A shoe-equipped tail skid ties into the stern post, and rubber shock cord is used to give it springiness.

A wing tip aileron is used. The horizontal stabilizer is adjustable on the ground and the fin is rigid. An unbalanced rudder is used. The elevators are of conventional design.

The weight of the motor is 46 pounds; the propeller, four pounds; the battery, 15 pounds ;and the fuel tank filled, 36 pounds.

The weight per horsepower of the engine is less than two pounds. Ordinary motor car gasoline and lubrication oil are mixed in an eight-to-one ratio and carried in a single tank built into the cowling directly ahead of the pilot.

A cowling door is built in to provide easy access to the ignition and carburetion compartment. The engine streamlines into the cowling.

Visibility is good. The gap where the wing is fastened to the cabane section is covered with celluloid. This makes possible easy inspection of and access to cable fittings. Inspection plates are provided in the wings.

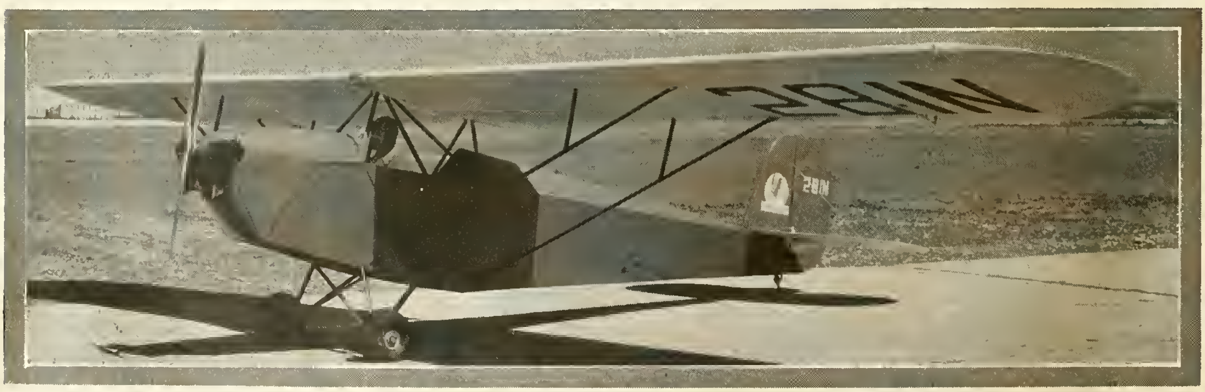
The Cleone motor gives the American Eaglet a speed of approximately 60 miles an hour at 2,600 revolutions per minute. According to the producer, the plane lands at approximately 15 miles an hour.

The American Eaglet, Cleone powered, has been flown with pilot and passenger. In this test, the plane took off in 13 seconds.

The plane is said to consume less than two gallons of fuel an hour, which would make the cost of operation for an hour less than 50 cents, discounting depreciation, maintenance and storage costs.

Specifications

Span	34 feet 4 inches
Length overall	21 feet 6 inches
Height	78 inches
Area (including control surfaces)	164.4 square feet
Dihedral angle	1½ degrees
Gross weight	750 pounds
Landing gear tread	54 inches
Payload	175 pounds
Cruising speed (Cleone engine)	60 miles per hour
Landing speed	15 miles per hour
Cruising range	3½ hours



The Cleone 25-horsepower American Eaglet, a new light parasol type monoplane

GERMAN AIRPLANE REQUIREMENTS

As Compared With Those of the Department of Commerce

(PART 2) By

Richard M. Mock and Eginhard Pappel

Ernst Heinkel Flugzeugwerke, Warnemunde, Germany

THE landing load factors for landplanes, according to the D.V.L., are derived in a way quite different from the American load factors. The D.V.L. obtains its load factors by a method based upon a calculation of the landing energy that must be absorbed. The method of determining the load factors for the landing gear is as follows:

The work diagrams of all the units absorbing shock, such as shock absorbers and tires, are plotted. A typical diagram is shown in Figure 5. It consists of plotting an external force P at the tire as ordinate against the deflection of the unit as abscissa. It is obvious that the total of the areas under these curves is the work done in absorbing any external force applied to the tire. This external load is applied in a plane normal to the propeller axis.

The external load P is such as to give an area under the curve equal to:

Energy $= C \cdot M \cdot V_L^2$

where

$$M = \frac{\text{gross weight}}{\text{acceleration of gravity}} = \frac{\text{kg}}{\text{m/sec}^2}$$

$V_L =$ landing speed $\frac{\text{m}}{\text{sec.}}$

C is a factor proportional to the vertical component of the landing speed at the moment when the wheels first touch the ground. Values for C for typical airplanes are given in Table III:

TABLE III—Application of Factor for Landing Energy

Factor for Landing Energy to be Absorbed (C)	Application to Airplane Group
0.0030	all H and all 5
0.0045	G_2 G_3 G_4
0.0055	P_3 P_4
0.0070	S_4

The load factor is $n = s \cdot e$ where e is the actual load factor and s the safety factor. If P is the external static load at one wheel to produce sufficient deflection to absorb the energy of the landing and if the weight of the entire plane is W, it can be seen that

$$e = \frac{P}{W/2}$$ and is usually close to 3.

For the design of the fuselage members, s is taken as 1.8, and smaller values are used for the landing gear; thus the energy of an *overload* condition is absorbed by the bending and buckling of the landing gear members and not by the fuselage. The axle has a value for s between 1.45 and 1.55, while the other landing gear members are designed with a factor s between 1.55 and 1.65. The two values are given to provide limits that allow the use of the standard tubing. When a factor greater than the maximum is used, all landing factors must be increased in proportion.

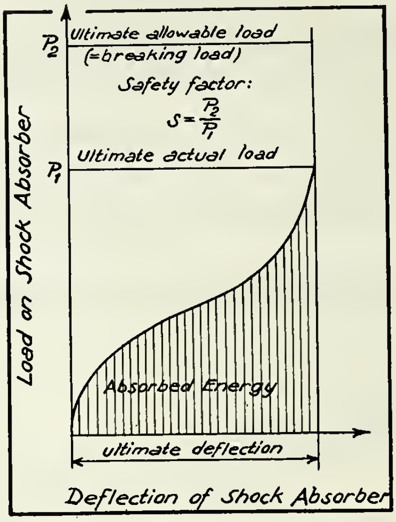


Fig. 5. Shock absorber energy diagram

The tail skid or tail wheel is designed according to the same system as described above; however, s is between 1.55 and 1.65. The energy to be absorbed is calculated with a formula like that for the front wheels except that the weight is the load on the tail when the plane is resting on the ground on three points.

One hardly can agree with the above assumption, however, since it sometimes leads to a tail skid stronger than the fuselage.

The D.V.L. is now completing a series of tests with an apparatus which automatically plots the curve for the shock absorbing unit with a free drop. The rebound may be dampened or allowed to work itself out as desired. On the basis of the results of these tests, the present requirements will be slightly altered.

Like the Department of Commerce, the D.V.L. has no consideration of the tread or of the height of the C.G. when considering the side loads on the wheels and landing gear, but it does consider the shock absorber when designing the wheel.

Landing conditions for float seaplanes and boats, according to the D.V.L. requirements, are much more severe than those of the Department of Commerce and sometimes the loads are little more logical. The load factor for the water landing condition is proportional to the form of the bottom of the boat, the type of service and seas that the airplane is apt to encounter, and the landing speed of the plane. There is no limit placed upon the landing speed allowable for water machines. The load factor for the landing is calculated as follows: (Figure 9.)

$n = s \cdot e \cdot C_1 \cdot C_2 \cdot C_3$

where $e = C_0 \cdot \frac{1 + a}{1 + a + a^2} \cdot V_L^{1.5}$

The factor of safety is s. For boat hulls and fuselages of seaplanes it is taken as 1.8, for floats and float bracing $s = 1.55$, but where the float bracing is part of the wing bracing or the floats are attached directly to the wings, the landing is calculated with $s = 1.8$.

$c_0 = \frac{1}{125}$ for airplanes flying along the coast and for inland waters where they are not apt to meet a seaway greater than 3. (This seaway corresponds on the Beaufort scale to the wind strength 4 with a wind of 12-16 m.p.h.)

$c_0 = \frac{1}{95}$ for airplanes to be used in the open sea designed for landing in a seaway of 5 (Beaufort scale 6, 22-28 m.p.h.).

c_1 This factor depends upon the purpose of the machine:

$c_1 = 1.1$ for training machines;

$c_1 = 1.0$ for passenger machines;

$c_1 = 0.9$ for freight and experimental machines.

c_2 is proportional to the angle at the keel between the planes of the bottom. If this angle is β (see Figure 8):

$$c_2 = 1 - 0.7 \cdot \cos \frac{\beta}{2}$$

c_3 is the factor used when the bottom has a special shape that might affect the landing or take-off conditions and is left to the judgment of the designer.

$a = \sqrt[4]{W}$ where $W =$ the gross weight of the machine in metric tons (2,205 pounds).

$V_L =$ the landing speed in kilometers per hour.

Figures 7 and 8 illustrate the various required landing conditions for seaplanes and for boat hulls. There are no requirements either of the D.V.L. or of the Department of Commerce regarding loading of the wing tip floats of a boat.

The landing condition with a load applied at the side must be calculated for three distributions: that is, with load applied at the bow, at the step and at the stern. It is usual to take the side load as applied one-third the distance from the keel to the water line. This is based upon the reasoning that the side load is in the form of a triangle declining from maximum at the keel to zero at the water line. This might be contrast-

ed to the Department of Commerce conditions where only half the distance is taken.

The D.V.L. water landing conditions for the distribution of the local load on the bottom is such that a load of 150 per cent of P is applied to 20 per cent of the water line area, giving a certain load per unit area at the step, bow and stern. The distribution across the bottom is not fixed; usually it is assumed to be uniform.

The value for the Department of Commerce water landing load factor is everywhere 8, regardless of the airplane, the form of the bottom, or the service the airplane has to encounter.

For the fuselage the Department of Commerce has ten required conditions. According to the D.V.L. the airplane must be calculated for all flight and landing conditions and, in addition, certain conditions with a combination of loadings. All flight conditions are required, including the tail reactions of each, with the loads applied symmetrically to both sides of the fuselage. Further, a torsional load going from the vertical tail must be calculated and in addition the fuselage must be calculated for two combinations: to seventy-five per cent of this vertical tail load is to be added (1) 75 per cent of the low angle of attack loads, and (2) 75 per cent of the nose dive loads. This gives unsymmetrical loading producing high torsional stresses in the rear portion of the fuselage. The Department of Commerce has no such combination of load requirements. It does require, however, that the fuselage be calculated for unsymmetrical wing loading, whereas the D.V.L. has no definite requirements on this score. The Department of Commerce requires that when a cabane is used it must be calculated for the high angle of attack, low angle of attack and inverted flight conditions with 100 per cent of the wing design load acting on one wing and only 70 per cent acting on the other. It is usual to get an unsymmetrical condition by calculating the fuselage for the wing loads in combination with the aileron loads and having this force equilibrated by inertia forces acting against the rolling movement. All of the landing conditions are calculated and correspond to those of the Department of Commerce, except that the braked landing is omitted, though according to the Department of Commerce requirements they usually do not design any fuselage members. In addition the fuselage must be calculated for certain nosing-over conditions, the first of which is like the landing condition where the wheels and nose are on the ground and a force is applied entirely at the wheels; according to the second nosing-over condition, the wheels are assumed just off the ground and the load is applied only at the front of the fuselage. The safety factor is 1.55 for the members immediately supporting the engine and 1.8 for the members forward and around the cabin or the cockpit. Thus it can be seen that in such a landing the front end of the fuselage will bend and fail and take much of the shock and thus protect the cabin or cockpit from being destroyed. All airplanes up to 5,000 kilograms (11,000 pounds) gross weight must also be calculated for an upside-down landing condition. Regarding the details of the method of calculating the fuselage the D.V.L. has no stated procedure such as suggested by the Department of Commerce; it leaves the method of calculating and the distribution of loads to the individual judgment of the designer.

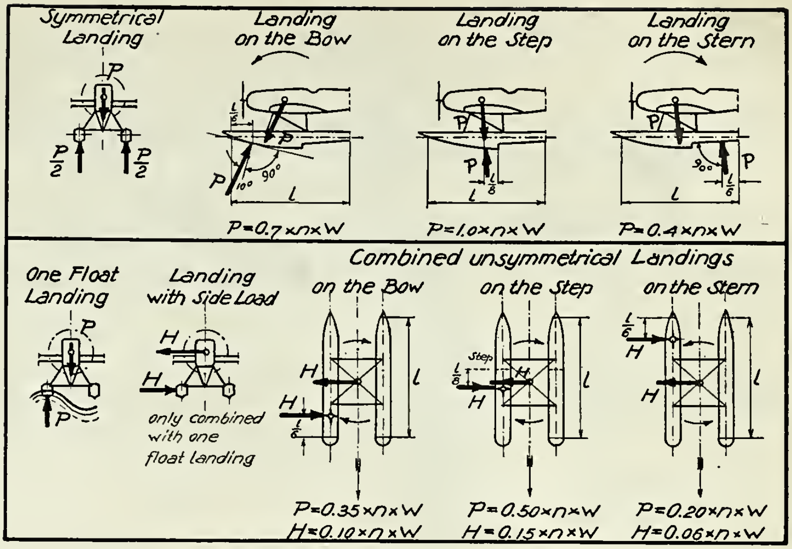


Figure 7. Diagram of landing conditions for float seaplanes

The landing conditions for landplanes are illustrated in Figure 6.

The engine mount, according to the D.V.L. requirements, is little more complicated to calculate than the method based upon the assumption of the Department of Commerce. Generally the D.V.L. assumptions are similar to those of the Department of Commerce. They require that the engine mount be checked for flight conditions, landing conditions and ground tests of the engine. The flight condition is at the high angle of attack, first with the engine throttled and having only the weight of the engine and the resistance of the wind. A second flight condition is similar to the first in that the high angle of attack loads are used but the engine mount is subjected to a maximum thrust of the propeller, maximum torque of the engine and a gyroscopic moment due to the turning of the propeller, and the tendency of the whole airplane to turn. For this condition the load factor for the weight and resistance is taken from the *HAA;* for all loading caused directly by the engine it is 1.8. Be-

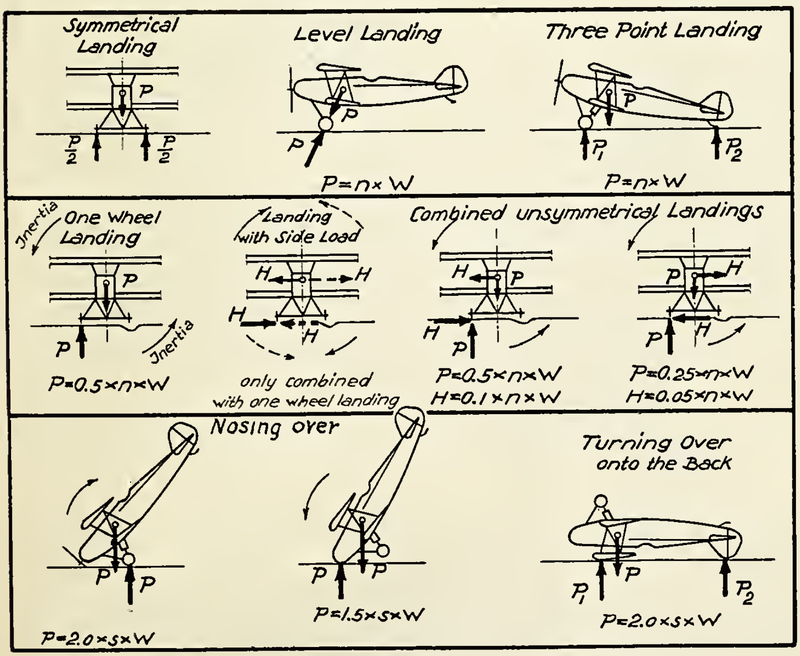


Figure 6. Diagram showing landing conditions for landplanes

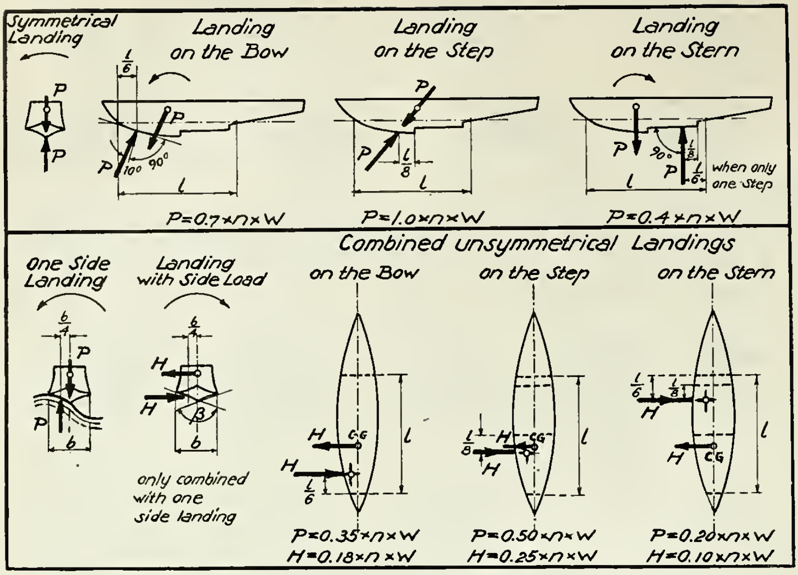


Figure 8. Diagram showing landing conditions for boats

sides, it is usual for acrobatic planes to be calculated for an additional condition for inverted flight.

For the landing condition the engine mount is calculated for level landing conditions for a land machine and for the step landing condition for water machines. The load is the same as for the rest of the airplane. The engine mount is also checked for the side load condition. In addition, a ground test condition is checked with a design load factor of 3 acting upon the weight of the motor and its parts, the maximum thrust and the maximum torque. Since the airplane is not in motion, the gyroscopic moment is zero. The D.V.L. does not give any form for calculating the torque of the gyroscopic moment but leaves it to the designer. The gyroscopic moment is calculated by the formula:

$M = I_P \cdot \Phi \cdot \psi$

...e I_P is the polar moment of inertia of ...opeller, generally found by a pendu- ...t.

...e angular velocity of the propeller,

... angular velocity of the airplane ...allest curve in a vertical plane.

...V.L. does not have any section of ...irements that is comparable to that the Department of Commerce under the ...ling of "Special Conditions." The ...L. states that the entire airplane must ...lculated for all flight and landing con- ...s and leaves some methods of calcu- ... to the judgment of the designers. The ...trength in the design of intermediate ...tures is also left to the judgment of ...esigner. But the Department of Com- ...e requires an overstrength of 5 to 10 ... cent, according to the kind of structure.

The D.V.L. book on required design and shop practice, mentioned in the beginning, is divided into six parts; namely, (1) properties of materials, (2) working of materials, (3) airplane structure, (4) power plant, (5) fixed equipment and (6) performance.

The first book is subdivided into a number of component parts: namely, material specifications, German standards for all standardized parts that are required to be used in the airplane, procedure for tests, what tests are necessary and minimum results allowable. Then a guide of the properties of the usual materials used is given. The above requirements cover steel, aluminum alloys, magnesium alloys, wood, glue, rubber and fabric.

Because of the lack of space, it is impossible in this article to go into the details of the requirements for groups 2, 3, 4 and 5. However, brief mention will be made of the required performance.

It is required that all landplanes be able to start with full loads and clear an obstacle 20 meters (65 feet) high placed 650 meters (2,130 feet) from the point where the airplane started moving. Similarly, the airplane in landing must stop rolling in 650 meters (2,130 feet). The minimum required climb is 0.8 meters per second (157 feet per minute) when the density of air is 1.1 kg/m³. With regard to stability it is required that the airplane be trimmed with the farthest rearward position for the C.G. and that when the elevator is left free the airplane climb with full throttle, fly level with normal cruising r.p.m., and that when the r.p.m. are diminished or the throttle cut a normal glide will result in which the velocity is not greater than 110 per cent of the gliding speed. With rudder controls free the airplane must be directionally stable, even if it is of multi-engine design, and one engine is throttled. If the airplane is put into a bank and the aileron controls are free, the airplane must return to a normal stable attitude without help. The maximum loads on one of the controls when the airplane is in level flight must not exceed 6 kilograms (13.2 pounds) and the loads applied to the controls to produce equal deflections of all control surfaces must be approximately equal. The maximum friction for control surfaces must be such that in normal flight any control when released will return to a neutral position of its own accord. Before being used commercially, all new types must have a minimum flying time of two hours and all prototypes one-half hour.

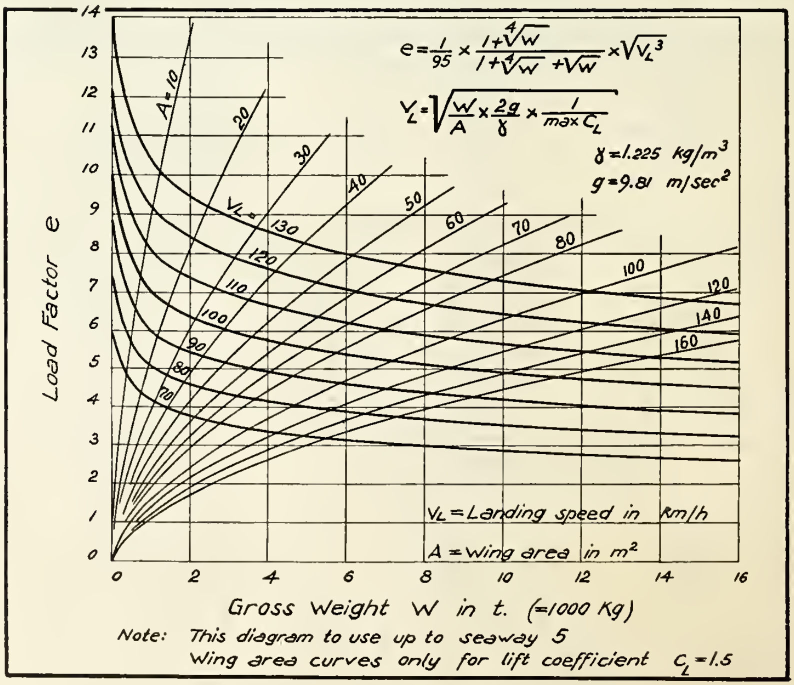


Figure 9. Load factors for the landing of seaplanes

RECENT AIRCRAFT PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C., at the rate of twenty cents each. State number of patent and name of inventor when ordering.

Floating air liner. Swan M. Lindstrand, Chicago, Ill. (No. 1,766,915).

Fuselage-frame. Arthur B. Stuart, Baltimore, Md. (No. 1,766,961).

Take-off device for aeroplanes. Dudley Canfield, Milwaukee, Wis. (No. 1,767,120)

Adjustable propeller. Jakob Haw, Berlin-Staaken, Germany. (No. 1,767,127).

Parachute. Rollie M. Lane, Colorado Springs, Colo. (No. 1,767,534).

Propeller for airplanes and the like. Samuel E. Slonimsky, Sawtelle, Calif. (No. 1,767,776).

Propeller. Gunnar C. Engstrand, Brooklyn, N. Y. (No. 1,767,786).

Floating body for seaplanes. Adolf Rohrbach, Berlin-Wilmersdorf, Germany, assignor to Rohrbach Patents Corporation. (No. 1,767,815).

Aerofoil. Henry Schleusner, Garner, Iowa. (No. 1,767,944).

Wing system with stabilizing vanes for aircraft. Louis H. Crook, Washington, D. C. (No. 1,767,966).

Parachute. Lynn Detzel, Brooklyn, N. Y. (No. 1,767,968).

Gyroscope group for automatically stabilizing and steering aeroplanes. Louis Marmonier, Lyon, France. (No. 1,768,128).

Article-carrier for airplane delivery. Sophia C. Donnell, Tampa, Fla. (No. 1,768,194).

Lighter-than-air aircraft. Charles D. Burney, Westminster, and Allan L. Bird, Cambridge, England, assignors to Airship Guarantee Co., Westminster. (No. 1,768,541).

Alighting gear for aeroplanes. Wilfred T. Reid, St. Laurent, P. Q.; assignor to Curtiss-Reid Aircraft Co., Montreal, P. Q. (No. 1,768,631).

Aircraft landing gear. Isaac M. Laddon, Dayton, Ohio. (No. 1,768,696).

Flying-machine. George F. Myers, New York, N. Y. (No. 1,768,708).

Aerial vessel. James Bowie, Edinburgh, Scotland. (No. 1,768,738).

Method and means of operating air lines (loading and unloading station). Anthony H. G. Fokker, Tenafly, N. J. (No. 1,768,754).

Amphibian plane. John C. Schleicher, New York, N. Y. (No. 1,768,863).

Aeroplane. August Bauer, New York, N. Y. (No. 1,768,877).

Aeroplane. August Bauer, New York, N. Y. (No. 1,768,878).

Airplane-wing structure. Charles A. Van Dusen, Cleveland, Ohio; assignor to Glenn L. Martin Co., Clevand. (No. 1,769,005).

Airplane. Mounie D. O'Donnell, Levasy, Mo. (No. 1,769,161).

Flotation attachment for airplanes. Cloice B. Hull, Cleveland, Ohio. (No. 1,769,180).

Helicopter. John P. Buckley, Washington, D. C. (No. 1,769,203).

Aeroplane. Henry C. Thompson, Oaklawn, La. (No. 1,769,320).

Aircraft. Leeor C. McCartney and Emory Croyle, Altoona, Pa. (No. 1,769,356).

Aeroplane. John T. Rydberg, Harrison, N. J. (No. 1,769,393).

Amphibian landing-gear. John C. Worthington, New York, N. Y. (No. 1,769,406).

Aeroplane. Floyd C. Boney, Fort Madison, Iowa. (No. 1,769,487).

Aircraft. John M. Gwinn, jr., Buffalo, N. Y.; assignor to Consolidated Aircraft Corporation, Buffalo. (No. 1,769,574).

Aircraft. Edward Hebert, Buffalo, N. Y.; assignor to Consolidated Aircraft Corporation, Buffalo. (No. 1,769,738).

Propeller. Frank W. Caldwell, Dayton, Ohio; assignor to Hamilton Standard Propeller Corporation, West Homestead, Pa. (No. 1,769,767).

Hub for propellers. Thomas A. Dicks, Pittsburgh, Pa.; assignor to Hamilton Standard Propeller Corporation, West Homestead, Pa. (No. 1,769,775).

Propeller. Ernest G. McCauley, Dayton, Ohio; assignor to Hamilton Standard Propeller Corporation, West Homestead, Pa. (No. 1,769,801).

Airplane, Frederick Ries, Compton, Calif. (No. 1,770,014).

Aeroplane. Axel H. Stone, Detroit, Mich. (No. 1,770,019).

Aircraft. Ludvig J. Rasmussen, Spokane, Wash. (No. 1,770,088).

Gyroscopic and aerodynamic stabilizer. Norman Clark, Canton, Ohio. (No. 1,770,199).

Rotary coil compass. Morris M. Titterington, Brooklyn, N. Y.; assignor to Pioneer Instrument Co., Brooklyn, N. Y. (No. 1,770,243).

Aircraft-steering system. Morris M. Titterington, Brooklyn, N. Y.; assignor to Pioneer Instrument Co., Brooklyn, N. Y. (No. 1,770,244).

Earth inductor compass. Morris M. Titterington, Brooklyn, N. Y.; assignor to Pioneer Instrument Co., Brooklyn, N. Y. (No. 1,770,245).

Compass direction controller. Morris M. Titterington, Brooklyn, N. Y.; assignor to Pioneer Instrument Co., Brooklyn, N. Y. (No. 1,770,246).

Inductor-compass generator. Morris M. Titterington, Brooklyn, N. Y.; assignor to Pioneer Instrument Co., Brooklyn, N. Y. (No. 1,770,247).

Refrigerator for moving vehicles (water-cooling system for aircraft). Charles D. Koch, Torresdale, Pa.; assignor to Keystone Aircraft Corporation, Bristol, Pa. (No. 1,770,276).

Aeroplane control stick. Henry E. Ohlke, Manistee, Mich. (No. 1,770,423).

Safety landing device. Stanley Maier, Detroit, Mich. (No. 1,770,528).

AIR-ISTOCRAT SR-4 LOW WING MONOPLANE

THE Air-istocrat SR-4 is a low-wing monoplane with a 110-horsepower engine and is manufactured by the U. S. Aircraft Co., New Brunswick, N. J. This plane has a top speed of 158 miles per hour.

The wings are of plywood, as is the fuselage back of the cockpit. The plane contains full set of instruments, level flight indicator, compass, etc. Other motors can be adapted to this model.

Landing speed is 55 miles per hour. Take-off run is 125 feet, and landing run is 150 feet without use of brakes. The plane is fitted with an adjustable steel propeller, N. A. C. A. cowling, dump valve, wabble pump, over-flow gauge, brakes, aluminum cowling from engine to the cockpit. The ship can be converted into a two-place job instead of a one-seater. Its fuel capacity is 45 gallons, which is sufficient for 500 to 600 miles at a cruising speed of 140 miles per hour.

The Air-istocrat single-seater low wing monoplane which has a top speed of 158 miles an hour.

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Officials of Waco Aircraft Company inspect Waco model "F" equipped with Goodrich Balloon Tires, now perfected for airplanes of EVERY type . . .

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Drilling High Manganese Steel Successfully

HIGH manganese steel generally contains 10 to 15 per cent manganese, 1.00 to 1.50 per cent carbon and the usual small percentages of silicon, phosphorus and sulphur. Nickel and other alloys are sometimes added to develop special physical properties. Metallurgically, high manganese steels are characterized by an unstable austenitic structure and the accompanying capacity for "work hardening."

To drill high manganese steel successfully, a sturdy, well proportioned tool is essential and the drilling machine must have a positive feed and speed mechanism powerful enough to drive the drill through. Tremendous pressure is exerted upon the tool when cutting. The work must be securely held. If a radial press is used, place the work so that maximum rigidity in the press is assured. If possible, warm the drill point before using. This is good practice to follow for any high speed steel drill. Some users heat up the manganese steel itself to about 400—500 degrees Fahrenheit. Although helpful, this is not absolutely necessary.

The peripheral speed of the drill should be between 12 and 15 feet per minute. Do not exceed 15 feet per minute. The feed should be between .003-inch and .010-inch per revolution. For example, a one-inch drill gives good service with a feed of .006-inch and a speed of 50 r. p. m. Do not use any coolant or lubricant.

The drill should not be allowed to idle or rub when starting a cut or after a cut has been started. For best results a hole should be drilled through in one continuous cut. Intermittent cutting, such as is produced when a drill is used in a ratchet brace, is not recommended.

On the "break through," manganese steel has a tendency to "spin," which is detrimental to the drill. A heavy feed during this period will increase the life of the drill.

Deep hole drilling offers difficulties and materially shortens the life of a tool, because of the excessive heat generated and accumulated in the manganese steel and the drill. For example, when drilling a 3½-inch deep hole with 15/16-inch drill, some users obtain best results by drilling down 2½ inches in one continuous cut and then continuing on through five or six other holes this same depth. By the time six holes have been drilled, the metal around the first hole is cool enough to permit the drill to start a new cut and drill one inch deeper without heating to the breakdown point. On deep cuts, some users have cooled the drill point in oil between holes. The practice of starting a new cut in a drilled hole or cooling the drill in oil are special exceptions to the general recommendations made above, but in the cases mentioned have proved to be practical.

It is good economy for the operator to note the condition of the cutting edges and corners as drilling proceeds. If the corners are dull for 1/16-inch to 1/8-inch back, it is advisable to remove the drill and regrind, although it apparently is cutting satisfactorily. By so doing, maximum holes *per drill* will be obtained rather than a few more holes per grind.

When the drill requires repointing, the instructions given hereafter should be followed carefully. Also note the point of the drill as received from the factory. This type of point has been especially put on these drills to meet the severest conditions and deliver the best service. As shown in the diagram, the point angle is 68 degrees, the cone angle is 120 degrees and the lip clearance 6 degrees to 8 degrees. In order to reduce the rake angle and give a stronger cutting edge, a flat section is ground on the lips as shown. This grinding operation also thins the web down to about one-half what it was before, or to about one-eighth of the diameter of the drill. Be careful not to blunt the edge so that a negative rake is produced.

Pointing Drills for High Manganese Steel Drilling

Figure 1 shows the correct point angle, clearance angle and appearance of the blunted cutting edge.

Figure 2 shows a method of blunting the cutting edge and reducing the rake angle. The lip of the drill is placed against the side of a grinding wheel in such a manner that the web is thinned at the same time the edge is blunted. This newly ground face should be parallel to the axis of the drill, or in other words, producing a rake angle which is less than 90 degrees. About one-half of the width of the margin is removed in this operation.

Figures 3 and 4 show different views of a correctly pointed Hercules Major drill.

Hercules Major drills should be ground with the same wheel and the same care as is the recommended practice for regular high speed drills. Be careful not to discolor or burn the drill edges when grinding, and do not place the drill in water to cool.

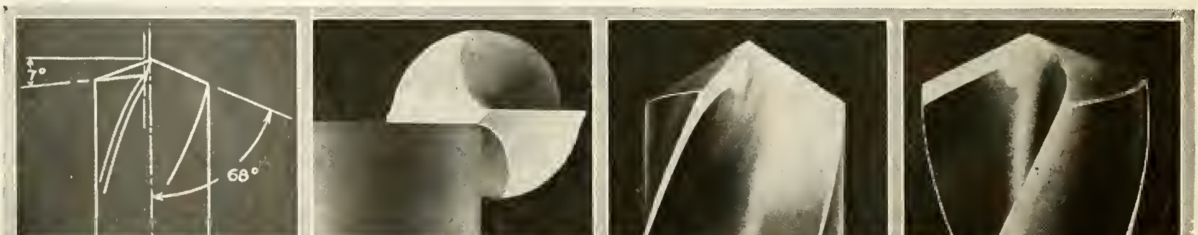
Calculating the Strength of Continuous Beams

IN the design of continuous beams subjected to transverse load only, it has been common practice to estimate maximum loads by substituting the numerical value of the modulus of rupture, as obtained in bending tests, in the usual equation of three moments. Further, for combined axial and transverse loading, two methods of calculation have been used. The more common one is the application of the generalized equation of three moments, while the other is an extension of the ordinary equation of three moments to allow for the moments introduced by the direct tension or compression load. In the second method, the deflection in the span at the point of maximum moment is calculated, neglecting the effect of axial load, and the product of the axial load and this deflection is added to the moment determined by the ordinary equation of three moments.

Both of these methods are used to calculate maximum loads, although neither is properly applicable beyond the elastic limit. The purpose of the study described in N.A.C.A. Report 347, by J. A. Newlin and George W. Trayer, was to investigate conditions after the elastic limit has been passed. As a result of the study, a method of calculation, which is applicable to maximum load conditions, has been developed. The method is simpler than the methods now in use and it applies properly to conditions where the present methods fail to apply.

The experimental work was conducted at the Forest Products Laboratory in coöperation with the Bureau of Aeronautics, Navy Department, and submitted to the National Advisory Committee for Aeronautics for publication. Over 300 continuous beams were tested under transverse load and under combined axial and transverse load. Loads obtained in test for beams of rectangular section were as much as 50 per cent in excess of loads calculated by the usual methods, with the average about 25 per cent. For I-beams the average increase was about 40 per cent. Fortunately, the error in the usual calculation is on the side of safety, but it is too great to be neglected in good design.

Report 347 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.



Figures 1, 2, 3 and 4 illustrating the proper angles for grinding and the appearance of correctly pointed drills

OBSERVATION AND BOMBING AIRPLANES OF FRANCE

(PART 1)

Paul E. Lamarche

IN my previous article I described the single-seater pursuit planes of France, which in that country are designated as the type C1 planes or *avions de chasse.* In this article I shall describe French reconnaissance and observation planes, as well as the larger bombing planes. In France these planes are designated as the A2 planes, two-seater observation or reconnaissance planes; B2, or two-seater day bombers; and the BN planes which are night bombers. There is also an RN type which is built for night reconnaissance work, and a large multi-place combat type.

For reconnaissance and day bombing the French have two good standard army planes in the Bréguet 19-A2 and the Potez 25-A2. These two ships, which are general purpose military aircraft, have been adopted by the air forces of many nations. Both constructors have, within the past year, designed and produced newer types of planes which are intended to succeed these two successful but older models. These more recent planes are known as the Bréguet 27-A2 and the Potez 39-A2, and both are of considerable interest as examples of the modern trend in European military aircraft construction. In the new Bréguet a greater concentration on the use of metal is evident; this is also true of the new Potez plane, which reveals a definite and striking change from the characteristic Potez wood construction. Both of these types have been undergoing the usual tests prior to possible adoption by the French military service.

Wibault planes, which are also interesting as examples of all-metal reconnaissance types, have been utilizing that material for some time. The new Wibault night reconnaissance twin-engine monoplane has recently been presented to the Technical Service for trials. A new Les Mureaux observation monoplane known as the 130-A2 has been undergoing the usual tests at the Villacoublay Field.

Taken collectively, the French observation planes are well built for the function for which they are designed and have won wide recognition for the records they have established. The Potez 25-A2 and the well-known Bréguet *dix neuf* are known for their long-distance flights as well as for their ability to carry heavy loads over great distances. Both of these planes can be used as A2 planes (i.e., two-seater observation planes equipped with photographic apparatus and wireless sending and receiving sets, as well as the normal defensive machine gun armament). They can also be used as two-seater combat planes or as B2 planes for light day bombing. When they are adapted for bombing, much of the reconnaissance equipment of these planes is displaced to provide for the weight of the bomb loading, though the same protective armament is usually carried.

Among night bombers there are three interesting types—the Amiot, the Farman and the Lioré et Olivier, all of which are biplanes. The Amiot is a large single-engined bomber of all-metal construction. The Lioré et Olivier is a twin-engine bomber, also of metal construction. This big bimotor night bomber is considered as the outstanding French night bombardment airplane, having been adopted by the French military service, as well as by those of other nations. The Farman "Goliath" night bombers, true to Farman characteristics, adhere to wood construction and represent a modernized version of the Goliath that was born during the World War. They are used not only by the French, but by other nations in Europe, as a standard night bomber and are among the largest and most powerful of this type in Europe.

The new Blériot combat plane, a description of which is included in this article, is an extremely interesting monoplane both from the viewpoint of its military value and of its construction. It is a highly developed multi-place offensive and defensive monoplane. It is designed to perform the combined duties of a combat plane, a bomber and a reconnaissance plane, though its primary purpose is to protect bombers or observation planes on flights over enemy territory. The arrangement of its armament is such that there are practically no obstructed angles in the line of fire of its machine guns. Although other types of bombers are protected by machine guns, mounted fore and aft as well as shooting downward through the fuselage, they nevertheless have obstructed angles in the line of fire which reduce the efficiency of their protective armament. Since, however, their first function is to carry bombs, the importance of their defense is secondary. On the Blériot combat plane defense is as important as offense.

Bréguet 19-A2 powered with a 500-horsepower Hispano-Suiza engine

The all-metal planes are constructed by assembling a number of easily demountable units. The wing of the new Potez, as well as that of the Bréguet, is built according to this idea to facilitate transportation and repairs. The big Lioré et Olivier bomber is arranged to permit quick change of engines since each motor with its mount and accessories is removable and replaceable as a unit.

In actual warfare reconnaissance bombing planes are required to have high performance for the successful accomplishment of their missions. The bomber must be able to lift its bomb load to high altitudes in passing over enemy lines so as to avoid the fire of anti-aircraft batteries. It must have sufficient range of action to fly far into enemy territory, and it is frequently called upon to defend itself when attacked.

Wireless equipment plays a vital and important role in the maneuvers of modern bombardment and reconnaissance planes, though it was not until the close of the last war that wireless was used with aircraft and even then it was in an experimental stage. With modern equipment, however, wireless messages can be sent and received for about twenty minutes after the plane has landed.

The duties of the observer in the modern observation plane are numerous, and his work is highly technical in character. He generally is the navigator, the wireless operator and the photographer. When his plane carries bombs, he is the bomber. When his plane is attacked, he has two machine guns on a ring over his cockpit, as well as a third gun firing through the fuselage in a downward direction, with which to defend his plane. He has at his disposal a number of instruments and devices for precision in firing and bombing at great altitudes. In contrast to the pilot of the pursuit ship, who often plays a lone hand in bringing down his victim, every member of the crew of the large multi-place war craft must coöperate to achieve success. Moreover, even the staff at the base must often assist by wireless in directing the planes while on maneuvers. Because accurate bombing has become as much a highly developed science as artillery fire on the ground, the bombing crews must be highly trained for this work.

In the following descriptions of French military aircraft considerable variety in design and construction will be noted. The newer types described are of particular interest inasmuch as they show the modern

trend in all-metal structures built up of many easily demountable parts.

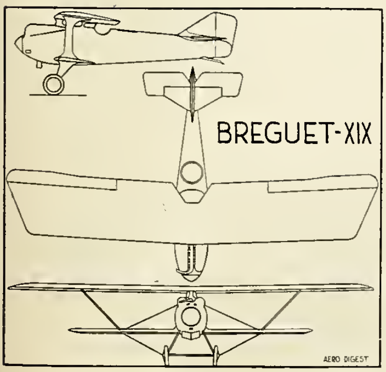
BREGUET

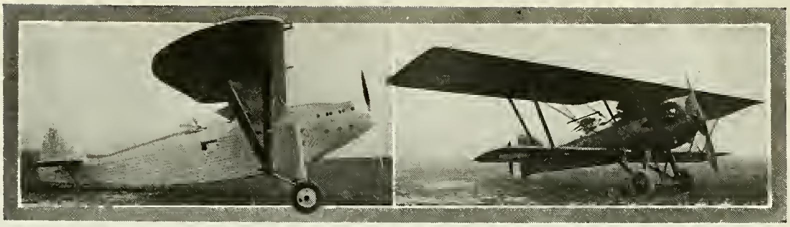
The Bréguet 19-A2

The Bréguet *dix neuf* needs little introduction, for it is well known everywhere as a result of its numerous record-breaking flights. In October of 1925 one of these planes won the Liberty engine trophy race in New York; the standard French army model is at present holder of several world records; and modified types, such as the *Nungesser et Coli* and the *Point d'Intérrogation* in which Dieudonné Costes has accomplished notable long-distance flights, have added to the number of records which these ships have established. As a military plane, the Bréguet *dix neuf* has been adopted as a standard reconnaissance and day bombing plane by many nations, some of which have acquired the license for its construction. In France these planes are built by Ateliers Louis Bréguet, which is located in Vélizy, a town in the Paris region.

The *dix neuf,* of metal construction, is designed as a two-seater sesquiplane for observation and light day bombing and is easily adaptable to serve either purpose. The upper wing, which is considerably larger in span and chord than the lower, is in two sections joined over the fuselage and supported by tubular cabane struts. The unbalanced ailerons taper toward the outer extremities and are on the upper wing only. The wing is built up of duralumin spars and duralumin ribs in girder form, fabric covered. The wings are externally braced on either side by an oblique I-strut of dural tube. Additional bracing of the wing is provided by cables.

The fuselage is built up of circular-section duralumin tubing. This can be taken apart in many places, since the longerons and cross-members are composed of a number of easily demountable sections. From the engine mount as far back as the observer's cockpit, the fuselage is covered with thin duralumin sheet; the aft section is fabric covered. The pilot occupies the forward cockpit, which is under the cutout in the wing, and the gunner-observer's cockpit is immediately behind. For observation work the armament consists of two fixed Vickers guns fired by the pilot through the propeller, two Vickers guns mounted on a Scarff ring over the observer's cockpit, and a fifth gun fixed to fire through the bottom of the fuselage. In addition, such equipment as photographic apparatus, wireless and equipment for night flying is carried. For bombing expeditions the photographic equipment is replaced by bomb racks.





Hispano-Suiza-powered Potez 39-A2; Lorraine-Deitrich-powered Potez 29-A2

The Bréguet 19-A2 can be powered with any air- or water-cooled engine of a power range between 450 and 600 horsepower. Among French water-cooled engines Hispano-Suiza, Renault, Lorraine-Deitrich and Farman powerplants are used; Gnôme-Rhone Jupiter air-cooled motors have also been used. The standard army plane carries a large fuel tank of 84.5-gallon capacity in the fuselage and two smaller tanks of 15.8-gallon capacity each, installed on the sides of the pilot's cockpit, these last two being auxiliary tanks which can be removed. Oil is carried in a tank at the side of the main fuel tank.

Specifications

With Hispano-Suizo Engine

Span of upper wing	48.65 feet
Span of lower wing	36.09 feet
Length	31.16 feet
Height	10.96 feet
Wing area	538 square feet
Weight empty (Jupiter engine)	2,846.65 lbs.
Gross weight loaded	5,512.5 lbs.
Wing loading	10.2 lbs. per sq. ft.
High speed	135 miles per hour
Speed at 6,550 feet	133 miles per hour
Speed at 16,400 feet	125 miles per hour
Climb to 16,400 feet	20 minutes 30 seconds
Ceiling	17,600 feet

The Bréguet "Tout Acier"

The Bréguet "Tout Acier" (all steel) was built as the successor to the *dix neuf* a year ago and was described in detail by the writer in Aero Digest for July 1929. During the past twelve months the Tout Acier, which is officially designated as the type 27-A2, has been undergoing tests at the Villacoublay Field as a result of which several changes have been made.

The upper wing on this ship has a greater span than its predecessor and, to afford better visability, is carried at a greater height over the fuselage. The wing is constructed of steel and duralumin. The interplane V-struts of sheet metal are so arranged that the angle of incidence of the upper wing may be varied slightly. The lower wing of the stub-type, making the ship a sesquiplane, is built out from a central caisson or box consisting of a triangular framework, the profile of which corresponds to the exterior shape of the fuselage. The frame of this lower wing has a single steel spar which is designed to carry a part of the plane's loading. The construction of the entire plane might be said to be built around the central caisson to which are attached th lower wing, the upper wing, the engine mount and the rear section of the fuselage.

The fuselage terminates abruptly immediately aft of the observer's cockpit, the tail being supported by a single steel outrigger extending from the bottom of the central caisson. The two cockpits, placed close to each other, are protected by a large windshield which extends to the upper wing. Doors on the left side of the fuselage provide access to the cockpits. The normal armament is two fixed machine guns fired through the propeller and two others mounted on a ring over the observer's cockpit. The lower part of the fuselage can be opened so as to adapt the plane for bombing missions.

The landing gear, which has an unusually wide track, is built up in two units, each of which consists of a duralumin wheel supported by a steel fork attached to the lower wing spar and enclosed by a streamlined casing. The tail skid, with which the Tout Acier was originally fitted, has been replaced by a wheel, and the ship is now equipped with brakes which may be applied to one wheel or both. Originally the elevators were carried half way up on the fin making a break in the rudder but are now below the rudder, which in turn has been redesigned. The plane is powered by a 500-horsepower Hispano-Suiza engine. Its fuel supply is carried in a main fuselage tank, as well as two smaller tanks which are installed in the lower wing and which may be dropped.

Specifications

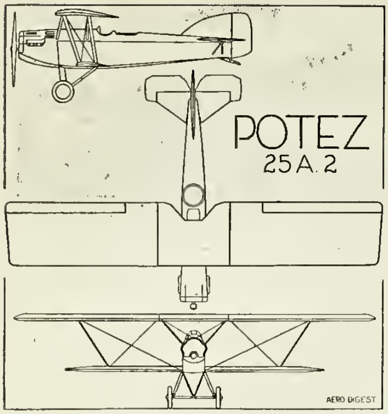
Span of upper wing	55.77 feet
Span of lower wing	24.93 feet
Length	32.15 feet
Height	10.76 feet
Total wing area	527.24 square feet
Track of landing gear	11.54 feet
Weight empty	3,319 pounds
Total weight	4,851 pounds

No performance figures availoble.

POTEZ

The Potez 25-A2

Another successful observation plane is the Potez 25-A2, which has been adopted by several nations as a standard reconnaissance and bombing plane. In fact, the the Société des Aéroplanes Henry Potez, at its plant at Méaulte in the north of France, has built more than 1,800 ships of this type for as many as twenty countries. This single-bay sesquiplane is especially adaptable for long-range observation work, the standard army plane having been used on several notable long-distance flights. Of simple wood construction, this plane can be



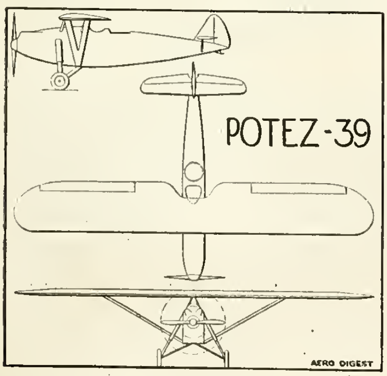
powered with any air- or water-cooled engine of a power range between 400 and 600 horsepower.

In form, the wings are rectangular with square ends. They are built up with spruce spars and plywood ribs and have a covering of fabric. The upper plane, to which the ailerons are fitted, is supported over the fuselage by four splayed-out cabane struts of steel tube. The fuselage structure, which is rectangular, is built up of wood with a plywood covering extending from the engine cowling to the rear of the observer's cockpit, fabric covering being used on the aft section. The pilot's cockpit is under the wide cutout in the upper wing; that of the observer is immediately aft of it. Dual controls can be provided. The empennage is built up of wood frames, fabric covered. The stabilizer is adjustable in flight, and the elevators are balanced. The undercarriage is of the cross-axle type with two lateral V's, and a transversal steel tube V, dividing the axle at its center. Shock absorbers of Potez patent are mounted on the front legs. For reconnaissance work the armament consists of two Vickers machine guns firing through the propeller, twin Lewis guns mounted on a ring over the observer's cockpit, and a single gun firing through the floor. Fuel is carried in a large fuselage tank.

Specifications

Lorraine Deitrich 450-Horsepower Engine

Span of upper wing	45.38 feet
Span of lower wing	33.1 feet
Length	29.85 feet
Height	11.87 feet
Chord of upper wing	8.2 feet
Chord of lower wing	4.16 feet
Area of upper wing	376.6 square feet
Area of lower wing	129.12 square feet
Total area	505.72 square feet
Track of landing gear	7.21 feet
Useful load	1,949 pounds
Fuel	551 pounds
Gross weight loaded	5,513 pounds



Performance

With a total weight of 4,322 pounds

High speed (sea level)	136 miles per hour
Minimum speed	50 miles per hour
Climb to 3,280 feet	3 minutes 15 seconds
Climb to 9,840 feet	10 minutes 40 seconds
Climb to 16,400 feet	21 minutes 22 seconds
Absolute ceiling	23,600 feet

Potez 39-A2

As in the case of Bréguet, Potez has recently introduced a new reconnaissance plane intended to supersede the older type. The new Potez represents a complete change on the part of this firm from wood to all-metal construction. The 39-A2 was introduced this year and has since been undergoing tests before the French Technical Service at Villacoublay.

The wing, which utilizes the Clark YH airfoil section, is of large span. It is supported over the fuselage by inverted V cabane struts and is braced on either side by oblique V-struts of duralumin tube which extend from the mid-section of the wing to the lower fuselage longerons. In form the wing is rectangular with rounded ends. It is built up of two I-section spars which are united by diagonals and ribs of steel and duralumin. The ribs are placed 33.46 inches apart, and they carry the wing covering of corrugated duralumin sheet which is riveted on in panels. The wing assembly consists of eight demountable sections. The central part of each section is built up with a forward spar and a rear spar, the leading edge being attached to the former and the ailerons to the latter. The internal duralumin bracing is rigidly assembled. The demountable panels permit easy inspection of the internal structure of the wing. The large central section of the wing is actually in the form of a caisson; the caisson or central section includes the cutout over the fuselage.

The fuselage, built up in three demountable sections, is entirely of duralumin with a truss structure. Like the wing, it is covered with corrugated duralumin sheet. The pilot's cockpit is under the cutout in the wing and that of the gunner-observer immediately behind.

The empennage structure is similar to that of the wing, being entirely of duralumin. The fin is mounted on the last frame of the fuselage, and the adjustable stabilizer is braced externally by an oblique strut on either side. The elevating planes are balanced.

The Potez 39-A2 is powered by an Hispano-Suiza engine with a normal power output of 500 horsepower, which may be increased to 580 horsepower at 2,000 revolutions per minute. Fuel is carried in a fuselage tank, the total capacity of which is 95.1 gallons. The tank is equipped with a dropping gear.

The landing gear is of the split axle type, equipped with brakes. Its track is 9.84 feet. Normal armament consists of two fixed machine guns firing through the propeller, twin Lewis guns mounted on a ring over the observer's cockpit and one gun firing through the floor, as well as the necessary equipment for reconnaissance work.

Specifications

Hispano-Suiza 500-Horsepower Engine

Span	52.49 feet
Length	32.81 feet
Height	11.15 feet
Chord	7.38 feet
Wing area	376.6 square feet
Weight empty	3,197 pounds
Useful load	1,764 pounds
Total Weight	4,961 pounds
Wing loading	13.12 lbs. per sq. ft.
Power loading	9.92 lbs. per h.p.
High speed (sea level)	146 miles per hour
Minimum speed	46 miles per hour
Climb at take-off	21 feet per second
Climb to 16,400 feet	21 minutes 40 seconds
Ceiling	24,600 feet

LES MUREAUX

Les Mureaux 130-A2

The new Les Mureaux 130-A2 reconnaissance monoplane was described in detail in my article in Aero Digest for April 1930. Briefly it is a parasol monoplane of all-metal construction which was designed by M. Brunet and built by the Ateliers des Mureaux. It was presented last year to the Technical Service at Villacoublay for tests. With an airfoil section known as the Brunet 7, the wing is rectangular in form with rounded ends. It is built up in two sections which are joined over the fuselage and supported by inverted V cabane struts. Its structure consists of box spars and tubular ribs of duralumin, the two spars and ribs being in the form of a Warren girder. The wing is braced on either side by a pair of N-struts extending obliquely to the landing gear.

The fuselage is rectangular in section with an arched top and is built up of four longerons of duralumin tube which are braced by vertical and diagonal members of duralumin which are riveted to the intersection members. The forward part of the fuselage has a covering of duralumin sheet as far back as the observer's cockpit, the remainder of the fuselage being fabric covered. The pilot's cockpit is under the cutout in the wing and the observer's, immediately behind. The empennage, of the normal monoplane type, is built up of duralumin frames with a fabric covering.

The landing gear is built up in two units, each of which consists of N-struts extending from the upper longerons of the fuselage and also from the outer sections of the wings; added support is provided by N-struts extending from the lower fuselage longerons. The lower extremities of these struts are joined to duralumin box frames which support the wheels and shock absorbers and which are covered with streamlined casings.

(To be continued in October issue)

BELLANCA "AIRBUS"

BELLANCA AIRCRAFT CORPORATION has developed the "Airbus," a single-motored airplane, for passenger-carrying and for combined mail and passenger work under the terms of the Watres bill. Carrying an unusually large payload behind a single engine of moderate horsepower, the Airbus has proved its adaptability to this purpose in a series of exhaustive flight tests. It has a high speed of 147 miles per hour and a cruising speed of 125 miles per hour at two-thirds full power.

The large payload of the Airbus has been obtained at no sacrifice of cruising radius; gasoline capacities vary in accordance with the needs of individual operators, but the 200-gallon capacity of the standard tanks is sufficient for a good cruising range against strong adverse winds. The payload consists of ten passengers and 250 pounds of baggage plus 500 to 1,000 pounds of mail, according to cruising range required.

The design of the ship concentrates the load near the center of gravity so that the stability of the ship is satisfactory under any of the varying load conditions between empty and full. The mail load, which may range from 500 to 1,000 pounds, according to the cruising range required by operators, is placed in pits in the lower stub wings near the center of gravity. The passengers' baggage compartments are under the seats and well forward, thus permitting heavy loads of baggage to be handled without sacrifice of stability and with safety. In the event of rough landings on poor fields, there is no unfixed weight behind the passengers that might shift forward.

The ship is a sesquiplane which has been developed from the experimental Bellanca plane, the *Roma*. The upper wings are similar to those of a conventional braced wing monoplane, except that each wing is divided into two panels. The inner or center section panels of the upper wings, in conjunction with the lower stub wings, form the inner bay, being joined together by struts of round chrome-molybdenum steel tubing faired with balsa wood and braced by streamline wires. From the outer end of each stub wing, another lifting surface (called the auxiliary wing) extends to the outer panel of the upper wing, thus acting as a bracing strut in addition to a lifting surface. These auxiliary wings taper both in plan and thickness from their widest part where they join the stub wing to the rear spar of the upper wing.

Upper wings, both inner and outer bay, are built entirely of wood. The lower stub wings and auxiliary wings are built of chrome-molybdenum steel, spars, ribs and compression members being welded into one piece. Lower stub wings act as lifting surfaces, form part of the landing gear structure and, as mentioned above, also contain the water-proof metal-lined mail compartments which have approximately 60 cubic feet of space.

The fuselage is also built throughout of chrome-molybdenum steel tubing and is calculated to withstand collapse in the event of a crash.

The engine mount is hung on ball joints of large size which prevent the development of wear or play. Since the mount is detachable, a Curtiss Conqueror 600-horsepower water-cooled engine, a Wright Cyclone 575-horsepower air-cooled engine, or a Pratt and Whitney Hornet B 575-horsepower air-cooled engine may be installed. All are geared two to one.

The landing gear represents a departure from conventional practice. The lower stub wings form part of the landing gear structure. The wheels go into recesses at the ends of these stub wings where the auxiliary wings join. Goodyear Airwheels, size 37 by 16, are used. These are mounted on forks attached to the front part of these recesses in the stub wings and are easily removable by taking off one nut and withdrawing the wheel spindle. The wheels are additionally cushioned and kept in their proper position by oleo struts. An oleo strut is placed on each side of each wheel, and these struts are attached about midway to beams running from front to rear of the landing gear recesses. The struts have a three-inch travel, and a movement of eight inches is allowed by the wheels themselves. Being faired almost completely into the lower wing, the landing gear does not produce the drag of a separate unit, producing the effect of retractable wheels.

Plans have been made to make the Airbus available as either a landplane or a seaplane, and by a combination of wheel and pontoon gear now under development, as an amphibion.

All controls are operated by the usual steel cables running over ball bearing Micarta pulleys. The cables to the tail surfaces run down the center of the cabin under the floor, and doors at intervals in the floor along the entire length of the cabin permit easy inspection and replacement. All controls operate to their full movement without tightening or slackening of cables. The ailerons and elevators are operated by a throw-over wheel. The rudder pedals are of the automobile type, presenting a neat appearance and reducing the opening in the floor or fire wall to small round holes instead of slots. The brake pedals are on the left-hand side. The right-hand pedals are easily removable by taking out two bolts. A feature of the control system is that the control of each aileron is separately connected to the wheel, thus providing control of either aileron in the event the other becomes inoperative.

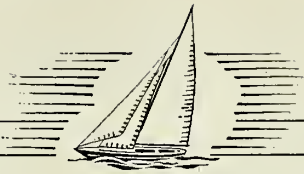
Bellanca Airbus seating arrangement

The pilots' cockpit is unusually roomy, with the two seats adjustable fore and aft by means of individual cranks. The cockpit may be entered through the cabin or through a full-sized door on either side. In each of these doors there is a window which can be raised or lowered by means of automobile-type cranks. Visibility both ahead and downward is provided through the unusually large amount of window area. A sheet steel fire wall separates the cockpit from the engine section. Heat for the cockpit is provided by means of a heater outlet under each pilot's seat.

The instrument board has been arranged to provide a maximum of convenience and ease of navigation. It is completely equipped and has electric gasoline level gauges mounted directly on the board. The ship

(Continued on next page)

The Bellanca sesquiplane "Airbus" powered with a Curtiss Conqueror 600-horsepower water-cooled engine



THE FINEST YACHT

THE FINEST CAR

AND NOW • • THE FINEST AIRPLANE

"I am used to fine things. I prefer them because eventually they're less expensive and from the outset they're the safest purchase to make.

"My first yacht was a dandy, but now I own one of the finest yachts built. The same with motor cars. When I drive myself I always take my best car because I know that I'll enjoy it in comfort, and in ease of mind. There's never any question—it always takes me swiftly and safely.

"I bought a Bellanca Pacemaker for these same reasons. Mr. Bellanca himself told me how and why, in his design, he had developed the features which attracted me to this fine airplane. I don't know all the technicalities—my pilot does, though, and you can't talk anything but Bellanca to him. But I do know that my Pacemaker was decidedly an investment. I know from personal experience that it's fast—and safe! I know that the same type of Bellanca monoplane flew twice over the Atlantic—and that it has won every national efficiency contest it has ever entered. I know too that Bellanca planes are owned by many other persons like myself, and by many companies like mine, and that other Bellancas are serving as airline transports through the most rugged conditions imaginable.

"In a word, I'm surer than ever that I've bought the finest airplane — and that's quite enough for me!"

BELLANCA AIRCRAFT CORPORATION

NEW CASTLE, DELAWARE

New York Office: Chrysler Building

Canadian Distributors: Bellanca Aircraft of Canada, Ltd., Montreal

"*The Bellanca Pacemaker* is a six-place cabin monoplane with 300 h.p. engine, Wright or Pratt & Whitney, finished in finest automobile coachwork. High speed, 145 m.p.h. Payload with pilot, 1,235 lbs. U. S. Dept. of Commerce Approved Type Certificates No. 129 and No. 328. *The Bellanca Skyrocket*, of similar specification, is powered with the 420 h.p. Wasp engine. High speed, 150 m.p.h. U. S. Dept. of Commerce Approved Type Certificate No. 319. Both types are readily convertible into excellent seaplanes. *The Bellanca Airbus* is a 12 to 14 place single-engined monoplane, particulars of which will be sent on request to any commercial operator.

BELLANCA

(Continued from preceding page)

is bonded and shielded throughout for radio, and provision has been made for the installation of parachute flares.

The cabin interior is unusually attractive, presenting a cheerful, pleasant and comfortable appearance. Seating is provided for ten passengers. The passenger seats on each side of the cabin are on a platform twelve inches high. This leaves a sunken aisle down the middle, permitting a tall man to stand erect. Baggage is stored beneath the platforms on which these seats rest. The seats, deeply and comfortably upholstered over steel tube frames, are provided with spring cushions. Individual adjustable ventilators and heater outlets are provided at each seat. Four seats are placed on each of the longitudinal platforms, and two more passengers sit on a built-in automobile-type seat at the rear wall. A completely equipped lavatory is entered through a door opening from the rear of the cabin by the side of this built-in seat.

In tests the Airbus showed no spinning tendencies and proved to be practically non-stalling. Recovery from any abnormal position in the air is automatic. Adequate control surfaces provide complete control at speeds even below stalling.

Specifications

Wing span	65 feet
Wing area	651 square feet
Length overall	40 feet 8 inches
Height	11 feet 6½ inches
Weight empty	4,950 pounds
Useful load	4,000 to 4,500 pounds
Standard fuel capacity	200 gallons
Total cabin capacity	400 cubic feet
Baggage compartment capacity	35 cubic feet
Mail compartment capacity	60 cubic feet

Performance

(Sea level with full load)

High speed	147 miles per hour
Cruising speed (2/3 full power)	125 miles per hour
Service ceiling	18,000 feet
Climb	750 feet per minute
Range with 200 gallons	840 miles

ROVER PARASOL MONOPLANE

THE Rover Model B-1, manufactured by States Aircraft Corporation of Chicago, Ill., is a two-place, open-cockpit parasol monoplane powered with a four-cylinder in-line air-cooled "Rover" engine, which delivers 70 horsepower at 1,850 revolutions per minute.

This ship has been designed to combine a high speed of over 100 miles per hour and a slow landing speed of about 35 miles per hour with a high factor of controllability and maneuverability. Seats are arranged to give a minimum of head resistance so as to increase the speed when combined with the effect of tapered wing tips used on this ship. The Rover is equipped with dual controls, and accelerating leverage is used.

The landing gear is of the split-axle type and is of 1025 welded steel and chrome-molybdenum tubing. The tread is exceptionally wide. Fuselage and tail surfaces are constructed of 1025 S.A.E. welded steel tubing. Spruce is used throughout in the construction of the wings, and the nose sheath is of aluminum.

Specifications

Span	32 feet
Chord	6 feet
Length overall	22 feet 6 inches
Height	8 feet 6 inches
Wing area	170 square feet
Aileron area	22 square feet
Rudder area	7 square feet
Fin area	3 square feet
Stabilizer area	16 square feet
Elevator area	14 square feet
Weight empty	800 pounds
Disposable load	550 pounds
Payload	210 pounds
Gross weight loaded	1,350 pounds
Wing loading	7.95 pounds per square foot
Power loading	19.3 lbs. per horsepower
Fuel capacity	30 gallons
Oil capacity	3 gallons
High speed	104 miles per hour
Landing speed	35 miles per hour
Cruising speed	85 miles per hour
Climb (sea level)	950 feet per minute
Cruising radius	550 miles
Service ceiling	12,000 feet

NEW BEARING METAL

A NEW bearing metal in the form of a self-lubricating bearing has been invented by W. C. Wilharm of the Westinghouse Research Laboratories. This new bearing can also be used with lubricant instead of the present oil-requiring bearing materials. If the supply, or film, of lubricant should for any reason become inadequate, this bearing is capable of resisting the heating action of friction for a considerable length of time by means of its own lubricating qualities.

The bearing is made by mixing one or more metallic powders with one or more materials yielding a soapy substance. The ingredients are put in a cold mold and subjected to a pressure of approximately 40,000 pounds per square inch. The temperature is gradually raised until it reaches about 400 degrees Fahrenheit—nearly twice that required to boil water. After keeping the mold at this temperature for half an hour, the pressure is raised to 200,000 pounds per square inch. The pressure is then released and the mold allowed to cool. After this, the bearing is removed from the mold.

Bearings made of this new material can either be made to certain specifications according to the mold used or they can be made in blank and machined to the size desired. This permits low production cost where many bearings of the same size are required.

LARGE SWING LATHE

A NEW model South Bend large swing lathe has been designed by the South Bend Lathe Works, South Bend, Ind., for machining work of large diameter on which light cuts are taken. This lathe is a regular 16-inch lathe fitted with raising blocks to increase the swing from 16¼ inches to 24¼ inches over the bed. The raising blocks are fitted under the headstock, tailstock and compound rest. This compound rest raising block is graduated on the base so that the tool can be fed to the work at any angle desired. Automatic cross and longitudinal feeds are provided and the apparatus is especially built for the cutting of screw threads.

The 70-horsepower Rover Model B-1 two-place monoplane produced by the States Aircraft Corporation

SPARK PLUGS FOR AIRCRAFT

By Hector Rabezzana
Chief Spark Plug Engineer
A C Spark Plug Company

FEW persons in the aviation industry, I believe, realize the painstaking work that goes into one of the smallest, yet one of the most important, units in an airplane—the spark plug.

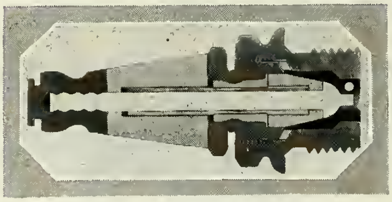
Spark plugs are constantly on test in the laboratory; they are continually being tested in flight in order to ascertain their characteristics under all kinds of actual operating conditions; they are perennially being studied by research and development engineers seeking new and, if possible, better ways to design and manufacture them. Moreover, these engineers also devote much study to aircraft powerplants that they may anticipate future engine design and keep spark plug development abreast, or even ahead, of engine requirements. Metallurgical engineers, ceramists, chemists, mineralogists and a host of men of science study ways and means to attain the ideal in the spark plug.

In twenty-two years the AC company alone has registered several hundred patents on its porcelain-insulated spark plugs; the same company has filed many patents on its mica-insulated spark plugs, which for fifteen years it made exclusively in England until the growth of the aircraft industry made it necessary to start producing them, a year ago, in its plant at Flint, Michigan.

A little more than thirty years ago, there was no suoh thing as a spark plug. Today the spark plug through years of progress has come to be dependable, trouble-free and long-lived.

During the progress of this work it became necessary to build and use instruments of almost unbelievable accuracy and refinement. For instance, one of the instruments, the oscillograph, is capable of accurately measuring as small an interval of time as one ten-millionth of a second. With this instrument it is possible to make photographs of an electron beam traveling at the enormous speed of 144,000 miles an hour.

The oscillograph made possible the development of a new and improved electrode wire called "isovolt," which is regarded in engineering circles as an important contribution to the aircraft and motor industries. The oscillograph is also used to record oscillations in an electric circuit up to a frequency of 20,000,000 cycles per second. Another of the instruments is capable of measuring currents as small as one-billionth of an ampere.



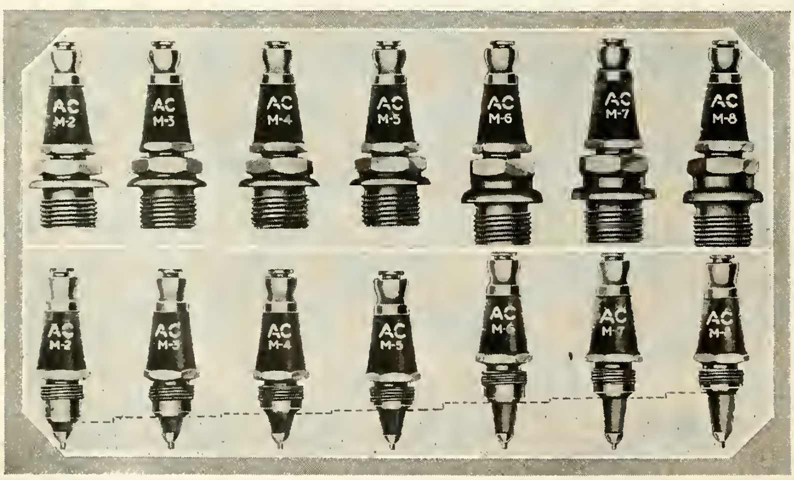
Sectional view of AC mica spark plug

These instruments are used in studying what takes place between the electrodes of a spark plug during the extremely short time in which the spark is passing. A complete spark occurs in only about one ten-thousandth of a second.

The manufacture of mica-insulated spark plugs for aircraft is unusually interesting. In the production of these plugs there are many operations requiring as much accuracy as is employed in making the most minutely exact part of an aircraft engine.

From the time the sheets of mica arrive in the factory until the finished plug goes out, inspection follows inspection. Selected mica is sliced into thin sheets, every one of which is carefully gauged and kept within .0005 tolerance.

Other sheets of mica are sent to a punch press where they are made into small "washers", every one of which is carefully inspected before being formed into insulators. The magnitude of this task of inspection may best be realized when it is considered that hundreds of these small "washers" compose the insulator, and every one of them is inspected individually.



The seven new AC mica spark plugs for aircraft in order of their heat range

The "washers" are fitted around the center electrode which is sheathed in a strong mica wrapper, known as the "cigarette". These units are sent to a specially-built machine which assembles them into the lower part of the insulator. The machine is automatically operated, making it impossible for plugs of the same type to differ so much as a few thousandths of an inch.

Following this, the plug goes to another automatic machine, electrically operated, which performs the same operation on the upper half of the insulator.

After several subsequent operations, the plug is completed and ready for tests, conspicuous among which are two electric tests and a gas leakage test. In one of the electric tests, the plug is subjected to an electric shock test far greater than it would meet in actual service. After the electric shock test comes the gas leakage test. Here eight plugs at a time are immersed into a water filled device and subjected to a pressure test.

Then the finished plug is ready for the packing department. Each plug is individually wrapped in a cellophane wrapper, packed in a small carton and then put into a larger container, ready for shipment.

Engineers, pilots, mechanics and others in the aircraft industry, have evinced interest in the recently developed AC spark plug "heat range" system. Therefore, in the belief that the information will be of benefit to those in the aviation industry as a whole, I shall set forth a few facts concerning application of the heat range system.

A spark plug must operate hot enough to keep from fouling and cool enough to avoid pre-ignition. The spark plugs with which an engine is originally equipped are, of course, designed for average operating conditions.

Hot-operated engines need a cold spark plug, and cold-operated engines need a hot spark plug. And this is where the spark plug heat range comes in. The heat range system consists of a group of spark plugs graded from the hottest to the coldest plugs.

In order to simplify the heat range system, each AC plug is identified by a number. The smaller the number, the colder the plug; the larger the number, the hotter the plug. It is perhaps easiest to remember this numeral system by associating it with the values of an ordinary thermometer.

The aviation industry today welcomes standardization; and in spark plugs the nearest approach to standardization thus far is the heat range system. A designer can now design an engine with the knowledge that a few dynamometer tests will enable him to choose the right all-'round plug for his engine without waiting for the spark plug manufacturer to work out this problem after he has built his engine. Moreover, if during the manufacture of an engine, the manufacturer is able to improve it further and increase its efficiency, he can immediately choose another plug for this condition that will exactly meet his requirements. Besides this, the pilot is enabled to change to a cooler or hotter plug, whichever happens to be the need, in order to suit cases of extreme conditions.

Digest of Foreign Technical Articles Relating to Aeronautics

By Elsa Gardner

AIRPLANE WELDING

Autogenous Welding in the Aeronautical Constructions (La soudure autogene dans les constructions aeronautiques), R. Granjon. "Aeronautique," Vol. 12, No. 132, May, 1930, pp. 169-173, 1 fig.

REASONS for the prejudice against welded airplane construction in France are discussed and are attributed to the fact that during the war this form of construction was adopted with very little knowledge of the process itself and with little regulation. Possibilities of this process in present airplane construction are outlined.

The author considers that the coefficient attributed to the human element, namely the welder, can be annuled by the development of automatic apparatus. The manual qualifications of the welder should be established by a qualified organization and he should be given a certificate of aptitude with periodic control.

The different factors of welding, which are considered of greater importance than the human welder, are taken up,—namely, the weldability of the metal, nature of the metal deposited, position and preparation of the assemblies and the regulations for the welding process.

AIRPLANE RIVETING

Riveting Processes in Metal Airplane Construction (Nietverfahren im Metallflugzeugbau), W. Pleines. "Luftfahrtforsthung," Vol. 7, No. 1, April 30, 1930, pp. 1-72, 144 figs., 44 tables.

THE riveting processes and tools employed in metal airplane construction are discussed with special reference to German practice and to impressions gained while working in the Rohrbach and Junkers plants. Processes developed in the latter plant for riveting sheet metal, construction of tubes, riveting water- and pressure-tight seams, and for making light coverings with hollow rivets are outlined.

The technical advantages of machine riveting are explained with the practical sphere of the various machines. Efforts of the Junkers concern towards automatic riveting are pointed out. Rivet sizes and the treatment and strength specifications of duralumin rivets are considered.

The second part of the article is devoted to the question of strength of duralumin riveted joints, the treatment and greater strength necessary, and to the question of cold riveting light metal joints. The results of a series of comparative strength tests are given for clearing up the question of the size of rivet hole and its strength in a duralumin riveted joint. The continuous change of hole form with different degrees of load is shown.

Report of the Deutschen Versuchsanstalt für Luftfahrt.

PROPELLER RESONANCE VIBRATION

Resonance Vibration of Propellers (Resonanzschwingungen von Luftschraube1), F. Liebers. "Luftfahrtforschung," Vol. 7, No. 3, May 16, 1930, pp. 137-152, 14 figs.

IN THIS STUDY of several possible kinds of propeller vibration, with special reference to resonance, the theoretical research treats separately the vibration due to torsion and to bending. The torsion frequency calculation shows that because of the forces acting on the propeller, the air reaction changes little, that it remains in a large degree uniform so far as the propeller r.p.m. is concerned, and that any danger through resonance in the form of torsion vibration is impossible.

For the bending vibration of propeller blades, frequencies are acted upon by the centrifugal force governed by the amplititude of the r.p.m. The bending frequencies depending on the propeller r.p.m. are calculated by the Raleigh principle of minimum self-frequency of an elastic system, the values thus obtained representing the upper limits of the bending frequencies. The frequencies of an elastic system subjected to several forces at the same time (decrease of elasticity and centrifugal force) establish the lower limits of the bending frequencies. For bending vibrations the air reactions are shown to be of even less importance than for torsion vibration.

For any propeller measurement with any ratio of hub radius to blade length, a single formula is set up for the bending frequencies depending on r.p.m. The frequencies at rest are shown for practical important cases of linear cross-sectional taper of propeller blade at different taper of cross-sectional moment of inertia. Formulas for bending frequencies with reference to the engaging shaft and for lower limits in case of linear cross-sectional taper are given. The lower limits influence the shape of each blade and are applicable for bending frequencies of curved or warped blades, being independent of manner of blade fastening to hub.

When bending frequencies are fixed above the propeller r.p.m., the expressed reasonance vibration in consequence of the outer excitation of the frequency of the single r.p.m. is subsequently impossible. On the other hand, expressed resonance cases are possible when the bending frequencies of the propeller become a low multiple of the r.p.m. Likewise by means of the transmission of the excitation of one blade against the other, resonances of twice the r.p.m. are possible. Practical results prove what the calculations indicate.

Report of Deutschen Versuchsanstalt für Luftfahrt.

NEW PROPELLER AIRPLANE DESIGN

Fundamental Lines for a New Type of Propeller Plane (Linee fondamentali per un nuovo tipo di elicoplano). L. S. Da Rios. "Notiziario Tecnico di Aeronautica," Vol. 6, No. 6, June, 1930, pp. 251-257, 5 figs.

THE author shows that his arrangement for utilizing the slipstream of the propeller can be developed into a type of propeller plans of which the essential characteristics are:—a resistance to greatly diminished motion, and a concurrent ascensional thrust, and, therefore, to an equality of energy absorbed and with an advantage over the functioning of a common aircraft.

The aerodynamic action of the La Cierva Autogiro and the Handley-Page slotted wing is explained, as well as the ring of eddy currents which reduce the frontal resistance if utilized. The supplementary pusher propeller operates at the mouth of a curved tube and, encountering less frontal resistance, is of much smaller diameter than the front propeller. The author's design is somewhat on the order of the Bellanca Tandem plane, but with the rear propeller operating at the mouth of a curved tube of the same diameter as the fuselage.

FUEL AND LUBRICATING OIL RESEARCH

Detonation and Lubricating Oil, R. O. King and H. Moss. "Engineering," Vol. 129, Nos. 3365 and 3367, July 11 and 25, 1930, pp. 31-33 and 99-101, 10 tables, 3 figs.

EXPERIMENTS made at the Air Ministry to determine the effect on detonation of lubricating oil when added to the fuel of an internal combustion engine are described. A Ricardo E-35 variable-compression engine was used and the highest useful compression ratio found for aviation gasoline with additions of benzole, ethyl fluid or iron carbonyl at full throttle, fixed ignition timing of 30 degrees advance, and with mixture strength giving maximum detonation.

Among the experimental results obtained are included the effects of iron and nickel carbonyls, of various oils and of dissolved BB mineral oil on benzole and ethyl fluid, the relative effects of castor oil and BB mineral oils dissolved in gasoline-ethyl fluid, and gasoline benzole mixtures. Also are determined the effects of lubricating oil on detonation in practice as regards airplane-engine oil consumption and the influence of the degree of dispersion of lubricating oil throughout the fuel air charge. The effects of lubricating oil and air temperature on the matching of fuels of dissimilar composition are discussed and in supercharged engines, the effects on detonation of the oil content and temperature of air fuel, supply are taken up.

The author concludes that the economic advantage of fuels given a high antiknock value by benzole or ethyl fluid, used at normal induction temperatures is considerably lessened when they are used in a supercharged engine without means for abstracting the heat generated by the compression of the charge.

Action of Antioxydants in the Oxidation of Unsaturated Fatty Oils. I. Mechanism of Inhibutory Action of Diphenylhydrazine and α Naphlylamine, B. Yamaguichi. Tokio Imperial University—Aeronautical Research Institute—Report No. 61, Vol. 5, No. 8, May, 1930, pp. 195-229, 11 figs., 13 tables.

RESULTS of investigations on the effect of unsymmetrical diphenyl-hydrazine and *a naphtylamine* on oxidation of unsaturated fatty oils, such as olive oil and castor oil at 100 degrees Centigrade, are

(Continued on following page)

DIGEST OF FOREIGN ARTICLES

(Continued from preceding page)

described. The rate of oxidation has been determined by measuring the decrease in iodine value resulting from oxidation.

Oxidation does not apparently start at once, the oil remaining seemingly unchanged during a period of incubation. Diphenylhydrazine acts as a strong inhibitor, prolonging the incubation period to a remarkable degree. The incubation period is not prolonged by *a* naphtylamine, although the initial rate of oxidation is much lowered by it.

Theoretical considerations on the mechanism of the inhibitory action have been made. It has been shown that the actual rate of the inhibited oxidation can be expressed exactly by the equation which has been established on the basis of Christiansen's theory of chain mechanism. Results seem to furnish a new proof of the existence of thermal chain reactions.

ULTRA-SPEED CAMERA

A New Ultra-Speed Kinematographic Camera Taking 40,000 Photographs per Second, T. Suhara, N. Sato and S. Kamei. Tokio Imperial University—Aeronautical Research Institute—Report No. 60, Vol. 5, No. 7, May, 1930, pp. 187-194, 13 figs. on supplementary plates.

DETAILS are given of old and new types of an extremely high-speed kinematographic camera which were developed for use in the Institute laboratory in connection with aeronautic research. The camera is capable of taking photographs at all speeds up to the rate of 40,000 per second. The normal speed projection at rate of 16 pictures per second of the prints obtained from these original negatives gives them an apparent reduction of 2,500 times in the speed of movement of the object photographed. About 1,000 photographic impressions can be taken on the film of four meters in length in this machine. Various photographs of the motion of sound waves inside a cylindrical and an elliptic shell taken with this machine, are shown.

METAL CONSTRUCTION

Metal Aircraft Production, "Automobile Engineer," Vol. 20, No. 269, July, 1930, pp. 245-248, 12 figs.

INSTRUCTIVE manufacturing operations in aircraft production at the plant of Boulton and Paul, England, are described. Successful attempts have been made to overcome the difficulties of cost by development of standard sections with a wide range of utility, and these sections, either alone or in combination, may be employed to build up necessary members for practically any airplane. They may be produced in either steel or duralumin.

A section of closed joint tubing is produced in long lengths of steel or light alloy with limits of accuracy in dimensions and uniformity of wall section unobtainable in the solid-drawn type of tube. Details are given of draw benches of the firm's own design which not only provide for dealing with longer sections but also proportionately reduce time lost in initial feed into dies. Spar spacing tubes are manufactured from strip material but in a series of five press operations. Reference is also made to the heat treatment processes, cutting machines and punching press, as well as to the anodic oxidation process employed for protecting components of aluminum alloys.

PROPELLER SHAFT STRESSES

Propeller Shafts, R. Dean-Averns. "Automobile Engineer," Vol. 20, No. 129, July, 1930, pp. 249-253, 4 figs.

A DETAILED consideration of the stresses involved in a propeller shaft is taken up. The author shows that should the stresses which arise from inaccurately mounted universal forks, producing non-coincident variations in angular velocity at each end of the shaft, be in opposition, then vibration is almost inevitable. Formulas are developed for calculating dimensions to conform with requirements concerning critical speeds, these dimensions being again checked with regard to torsional resilience or elastic strain energy in order to ensure that the material is not stressed torsionally above its elastic limits.

A suitable section of arm is obtained by calculation of stress at various sections with given formulas and grading the profile to suit dimensions. Ring pins present a little more complication mainly because of inconsistencies in lubrication. A joint is illustrated which accomodates the majority of stresses acting on the fork pin. Reasons for a required frequent change in lubrication are outlined.

AIR-COOLED ENGINE PROGRESS

Developments in Air-Cooled Aero Engines, A. H. R. Fedden. "Engineering," Vol. 129, No. 3365, July 11, 1930, pp. 55-56. See also "Engineer," Vol. 149, No. 3886, July 4, 1930, pp. 18-19, 1 fig.

IN TRACING the developments in this type of engine in the past ten years, the author states that air-cooled engines were responsible for making heavier-than-air machines practicable, and outlines their advantages. In the near future he believes a 1,000-horsepower air-cooled engine will be required for both military and commercial work. He believes the compression-ignition engine has considerable future, but, for smaller types of power unit does not seem extremely hopeful. When one considers the requirements of large aircraft remaining in the air for many hours, where a 25 per cent lower fuel consumption would be of utmost value, it is believed the compression-ignition engine will come into its own.

The author's firm have been experimenting for some time with a single-cylinder air-cooled compression-ignition unit of 7 3/8-by-12-inch and 512-cubic-inch. capacity with very promising results. An output of 80-brake horsepower with fuel consumption of 0.43 pound per brake horsepower per hour has been obtained.

Paper presented before the Institution of Mechanical Engineers.

AERIAL PHOTOGRAPHY

Aerial Photography in the Practical Applications with Particular Reference to the Nistri Method of Restoration (L'Aerofotogrammetria nelle sue pratiche applicazioni con particulare riferimento al metodo di restituzione "Nistri") U. Nistri. "Aerotecnica," Vol. 10, No. 5, May, 1930, pp. 351-368, 7 figs.

AFTER some references to the work of other Italians, and a rapid examination of modern methods of aerial photography, the author explains the criterions he has directed in the conception of the appropriate methods and in the construction of its apparatus for taking and restoring photographs. This is affected by a fixed luminous bi-projection, producing in space a plastic similar to an anteroom in a ratio exactly determined, and in a measure, operating on such plastic for contact of an index traced on a moving arm in three directions referable to the third of the topographic axes. The horizontal projection of the movements of the given indices are reproduced mechanically in the scale desired for the designed map.

ENGINE TORSIONAL VIBRATION

The Calculation of Torsion Vibration of a Multiple-Mass System with Special Consideration of the Conditions of Engine Applications (Die Berechnung erzwungener Drehschwingungen von Mehrmassensystemen, mit besonderer Berucksichtigung der Verhaltnisse bei Motorenlagen), H. Behrens. "Zeitschrift fur Flugtechnik und Motorluftschiffahrt," Vol. 21, No. 12, June 28, 1930, pp. 297-305, 27 figs.

FORMULAS are developed by the help of which systems capable of torsion vibration with as many masses and exciting moments as desired may be reduced to one equivalent mass and equivalent moment, which give for the contemplated parts equal vibration deflection. Under the supposition that the vibration systems exist principally in equal large masses with equal elastic spans and equal exciting moments (circumstances of engine construction), simplifications are derived which in simple form permit the computation of the vibration deflection and suitable vibration stresses. A summary is given in which the span must have the working r.p.m. of a critical r.p.m. if the additional vibration stress is bound not to exceed a settled amount. The serviceability of the formulas developed is proved by one practical example and the obtainable vibration deflection compared with values established by measurement.

AIRPLANE DESIGN

Concerning the Calculation of Airplanes: Determination of the External Forces (Sur le calcul des avions: determination des forces exterieures), E. Carafoli. "Aèronautique," Vol. 12, No. 134, July 1930, pp. 265-270, 7 figs. (Continued from preceding issue and abstracted in AERO DIGEST for August).

EMPLOYING the equations determined in the previous article for the forces acting on the framework on the wing with single spar, and with two or more spars, the author takes up the choice of profile for wings in each of these three cases, as well as the calculation of the external forces acting on the fuselage and tail surfaces.

In determining the setting and profile of the horizontal impennages, the author states that the conditions of drag anticipated in the setting of the load are in general arbitrary and very far from reality. He makes a comparison between actual conditions deducted from the equilibrium equations and those imjosed by the Service Technique Français for setting the loads, taking as an example the horizontal empennages of the airplane I.A.R. 11 Cl. It is shown that the application of these formulas to the calculation of the drag of the empennages is deceiving. In computing the vertical empennages, the difficulty consists in determining the force which would be exerted on them in acrobatic evolutions or in sudden changes of direction.

BURNELLI TRANSPORT CONSTRUCTION

By Vincent J. Burnelli

THE new all-metal Burnelli 20-passenger transport recently tested incorporates a new type of structure possessing important advantages in strength-to-weight efficiency. Outstanding advantages of this type of construction are reduction of fabricating expense and greater durability afforded by the heavy, flat, stressed skin covering.

The total skeleton framework consists of only twelve varied sections of extruded dural and five thicknesses of flat sheet, all material having been received and fabricated and heat-treated condition. Sharp bends and the requirements of working the material have been avoided. The skeleton structure and shell-skin covering is joined with commercial type riveting. The rivets, which have brazier heads, range from ⅛-inch to 5/16-inch diameter.

The primary structure, which is covered with heavy, flat plate continuous sheet to take diagonal loads, reduces to a minimum the secondary members required, thus substantially reducing the parts list and providing a durable shell covering sufficiently rigid to walk upon, valuable for its wear and tear resistance in handling, servicing and under conditions of long exposure.

The fuselage is of airfoil contour 12 feet wide by 36 feet long by six feet eight inches deep, and having high rectangular cross-sections. In plan it tapers from 12 feet at the rear of the cabin section to seven feet six inches at the trailing edge, from which the tail outriggers are attached.

Seven bulkheads of extruded T-section form the fuselage; four main longerons of extruded angle, 2½ by 2½ by 1/8 inches, space the members. Auxiliary longerons of T-section are at the upper and lower center of the bulkheads. Secondary members running fore and aft of U-sections, 1.5 by 1.5 by .032 inches, formed of sheet metal dural are spaced at 18-inch intervals for skin reinforcement; this arrangement also provides great reserve resistance to telescoping. The airfoil skeleton structure held in the erection jig is covered with flat sheet .040-inch on the sides and .032-inch on top and bottom. This thickness of metal is flanged over the corners and riveted with heavier and fewer rivets without reducing strength compared to the greater number of fine rivets required with a structure using more fragile skin.

Diagonal strains at doors and windows are taken in shear by proper flat gusseting at all corners.

The special wide sections of the T's, angles and channels used are efficient in riveting area and are further secured by lashing the heavier skin at the junctions. All cabin border members for tapestry panel mounting, floor and partitions are of metal rigidly attached to the main structure.

All main wing, landing gear and tail fittings are of heat-treated chrome-molybdenum steel or forgings of similar material.

The detachable engine frames are mounted on machined sockets attached to the front spar bulkhead at longeron junctions based on the wing and landing gear fitting reinforcement plates. The floor is of balsa core ply-metal. The walls are of panelled Insulite for sound-proofing, all units being fabricated outside and detachably installed.

The engine mountings are of chrome-molybdenum tubing welded with gussets and are of rectangular formation, the attachment to fuselage being by two sockets, one upper and one lower, allowing the engine mounts to swivel on vertical axes and to be detached. The triangular arrangement with base at fuselage, on impact, would spread apart vertically, thereby absorbing shock and forcing structural members away from the safety bulkhead separating the passenger compartment from the engine section.

Side bracing between the dual engine mounts is by detachable means at the engine bulkhead and radiator frame which spaces the engines and forms the fuselage entering edge. The heavy flat skin covering the engine section is attached to these members, providing excess transverse rigidity.

The control cockpit is of box-type construction similar to the fuselage main structure. The controls are mounted for ease of assembly by means of jig and fixture. All control parts are of chrome-molybdenum tubing or formed flat heat-treated sheet. Below the pilots' seats is a grillwork allowing vision through the large window in the bottom of the fuselage entering edge. Sliding doors are used in the engine section for minimum interference.

Landing gear struts, attached directly to the front and rear wing spar bulkheads, are of 2.5 by .125-inch chrome-molybdenum heat-treated tubing with machined sockets brazed in. The divided axles, attached to the lower center of the front spar bulkhead, are of similar material of telescoping tubing heat-treated to 180,000 pounds per square inch. Struts and axles are faired with flat sheet dural sufficiently ribbed to withstand vibration and the wear and tear of commmercial maintenance.

Goodyear Airwheels (46 by 20 inches) with brakes are installed. They use only 12 pounds pressure and provide sufficient bearing area to allow safe landing on a soft surface. The tread of the wheels is 17 feet 6 inches. The wing height is sufficient to clear the ground with a wide margin with one tire flat, and safe landing can be made in such a condition.

The tail is provided with a 22-by-10-inch Airwheel without shock absorber. It is of the full caster type, permitting easy ground maneuvering and eliminating the need of a dolly for ground handling. The mount is of heat-treated chrome-molybdenum steel.

Wing panels are 14 feet in chord by 37 feet in span, having 540 square feet each, the main structure corresponding to the fuselage framework. The front and rear spars are of T-section flanges; top and bottom section area and reinforcement are varied from root to tip according to load variation. The braces are diagonals of varied thickness formed by sheet channels and angles, all edges being turned at right angle for one-quarter the flange widths. Being 3.5 inches deep, the spar stems to which the double truss members are attached at both sides provide sufficient riveting area for the required strength without extra gusseting. The rivets required are all in double shear.

Combination contour and compression ribs of trussed type are spaced at intervals of approximately five feet and designed to carry the large air load for the area between. Six stringers top and bottom of Z-section formed sheet, one by two and a half inches, run parallel to the spars and are secured to the compression ribs at an average spacing of 18 inches. The skin of .020-inch flat sheet is riveted to spars and stringers, and the spaces between the stringers are backed by light angles running fore and aft.

This method of metal covering allows

the drag load to be easily taken. Also, the tension strength of the flat sheet is advantageous for great torsional rigidity for the cantilever section as affected by the center of pressure travel and aileron action.

A high reserve margin of safety is secured by the compression strength of the curved upper surface with skin securely supported by the stringers attached thereto and the tension strength of the lower skin, which for the 14-foot chord total 3.5 square inches of metal.

The fuel tanks of 450 gallons each are mounted in the section between ribs at the wing root, over which the detachable skin covering is secured in a manner which provides the strength of the riveted covering.

An important maintenance feature possible with the thick straight wing with lattice spar is the hinged wing tip and passageway through the wing to permit inspection, repairs and preserving treatment of all internal structure.

The wing struts are designed as pin joint members. They are attached to the spar bulkhead bases at points located 43 per cent of the spar length. The struts of H-section formed by joining four angles are streamlined with heavy flat sheet, contributing to greater fixity of the strut structure.

With the present values allowed in analysis, wings using flat metal covering are not credited with the greater strength which they contribute, it being required to design the spars on the same basis as when using fabric covering. This is because the metal wing is still new. Later research and proof testing with stressed metal skin construction will no doubt permit the use of higher values for the spars or will include the contribution of the skin which has proved to be a valuable strength factor in caisson spars and their design. The covering on the Burnelli wing at .020-inch gives a skin weight of .60-pound per square foot (with primer). The wings with struts complete weigh 2.15 pounds per square foot.

The tail group is extended rearward and above the airfoil fuselage by the fins spaced seven feet six inches apart. Fins serve as outriggers and are formed of longitudinal and upright members of box-shaped dural with control cranks and stabilizer adjustment attached thereto. They are covered with .032-inch flat sheet. Internal riveting is reduced to a minimum by the process of joining the framework and covering simultaneously.

The stabilizer has two box spars of flat sheet with ribs of ¾-by ¾-by-1/16-inch extruded angle webbed together at intervals. The simplicity of this type of control surface construction which overcomes riveting difficulties is the result of the process of completing the surface in two section by attaching all members to the covering, joining them by securing the rib webs, and then riveting the entering and trailing edges. The elevator and rudders are similarly constructed, the trailing edges being reinforced by ¾-by-1/8-inch

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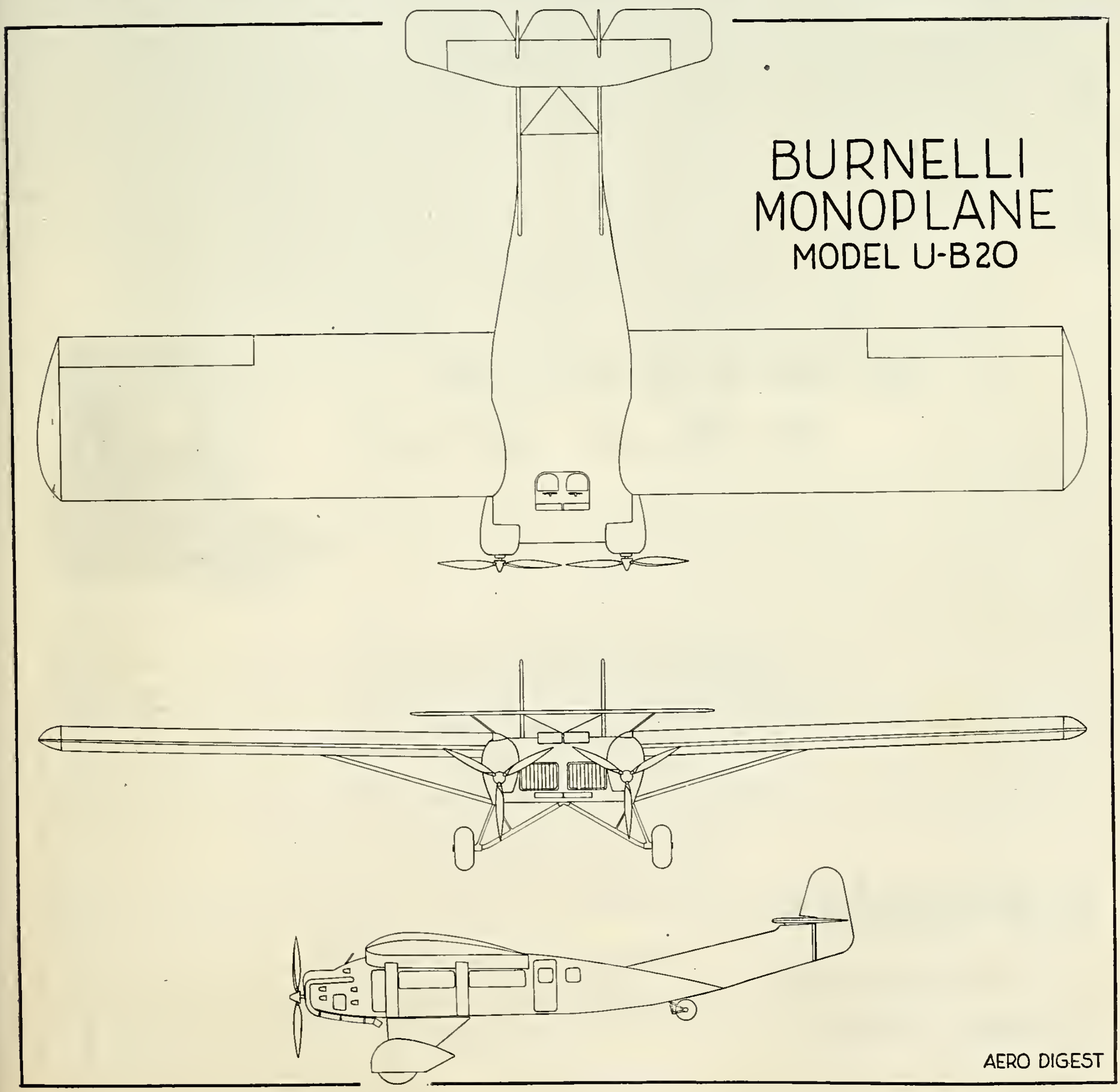

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strip of dural inserted between the sheet covering and then riveted. Dural cantilever horns are attached to the root of each surface and driven in unison by push and pull tubes extending through a slot in the fin which conceals the control cables and bell cranks. All surfaces are counter balanced for ease of control and the reduction of torsional load. Horns are attached at the bases of the surfaces without external bracing.

A horizontal strut and the cross cables between the fins take the side load, and torsional strength is provided by a vertical truss below the rear stabilizer spar, with streamlined tubes supporting the stabilizer and elevator overhang.

Structural Weights

The structural efficiency of this type of multiple-engined airplane design is the result of the compact arrangement of the main weights and the relation of the structural units thereto. The propellers, powerplant, landing gear and wing truss loads are applied at the main bulkheads instead of through the wing truss and generally indirect as with the nacelle type.

The concentrated application of main loads simplifies engineering and effects weight reduction to meet the load factors required for this class of airplane.

The following table lists the structural weights of the various units of the airplane.

Weights (pounds)

Wing group	2,734
Empennage	420
Fuselage	1,889
Landing gear group	809
Weight of entire structure	5,852
Powerplant group	3,856
Furnishings and fittings	822
Controls (wires and cables)	125
Total weight empty	10,655
Cargo load	3,740
Gasoline (480 gallons)	2,880
Oil (30 gallons)	225
Total fuel load	3,105
Total disposable load	6,845
Gross weight loaded	17,500

THE AERO SAVER

THE Aero Saver, manufactured by the Lockheed Specialty Company, Milan, Ohio, is a pneumatic cushion that prevents the passengers or pilot of an open-cockpit ship from striking the instrument board or cowling in the event of a crash. When deflated the cushion folds into a small space, and is mounted with quick release pins directly under the forward edge of the cockpit cowling. It is so connected to the hinged windshield that, by the release of a pin, the cushion is unfolded and the windshield tipped up to act as an air scoop to inflate the cushion. Check valves prevent the air from being accidentally forced out again. Less than 50 feet of travel of the airplane is sufficient fully to inflate the cushion. The time required for operation is two seconds. The added weight to the ship is 2.5 pounds per person. Aero Savers may be installed in two hours in a two-place airplane.

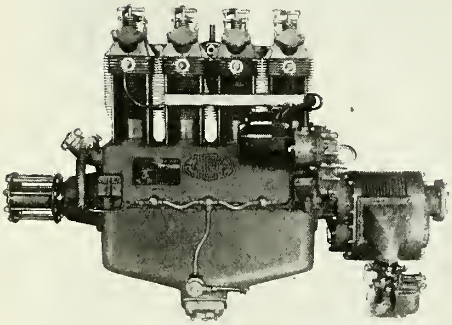
TUNED-REED COURSE INDICATOR FOR 4 AND 12 COURSE AIRCRAFT RADIO RANGE SYSTEM

BUREAU OF STANDARDS RESEARCH paper 160, by F. W. Dunmore. For the 12-course radio range system, in which three modulation frequencies are used, a type of reed indicator has been developed to indicate when the aircraft is on any one of the 12 courses, and if off, approximately how many degrees and whether to the right or left, and, in addition, to indicate to the pilot, in case he becomes lost, which course he is nearest, how to turn to get on it, and which way he is flying on it. This is accomplished by the use of three reeds in the visual indicator, each reed being tuned to one of the modulation frequencies sent out by the radio range, namely, 65, 86.7, and 108.3 cycles. Unequal amplitudes of vibration of the reeds indicate the plane is off the course to the side of the reed having the greatest amplitude. A simple shutter with windows in front of the vibrating reeds, exposes any two at a time. The correct two for a given course is determined by a color system which is exposed by the window to correspond to the color of the particular radio range route marked on the map. A second shutter and color system is provided so that the rule, "Longest reed indicates side off course," may be made to hold regardless of the course being flown or the direction of flight.

. . . . American Cirrus Greatest Test of

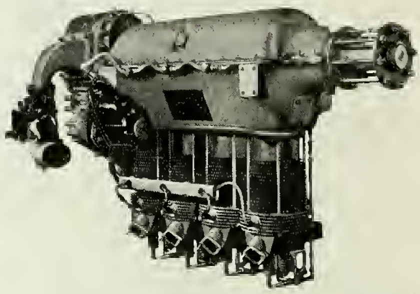
—These Are The

First



Cirrus with DePalma Supercharger

Second



Hi-Drive with DePalma Supercharger

All-American Flying Derby, longest Air race ever flown, confirms the leadership of Cirrus engines in the light plane field. » » »

55,410 miles without a change of engines.

55,410 miles without an important repair to an engine.

55,410 miles at 17 miles to the gallon of gasoline.

55,410 miles of record-breaking achievement in which stock model shared with specially built plane.

Result

1st.	Lee Gehlbach, Command-Aire Little Rocket. (Supercharged Cirrus)
2nd.	Lowell Bayles, Gee Bee Sportster. (Supercharged—Hi-Drive)
3rd.	Charlie Meyers, Great Lakes Special. (Hi-Drive)
4th.	Henry Ogden, Ogden Osprey. (3 Cirrus Engines)
5th.	W. H. Cahill, Great Lakes Trainer. (Cirrus)
6th.	Larry Brown, California Cub. (Cirrus)
7th.	Stanley Stanton, Cessna Monoplane. (Supercharged—Hi-Drive)
8th.	J. R. Wedell, Wedell Williams Racer. (Supercharged Cirrus)
9th.	Cecil Coffrin, Great Lakes Trainer. (Cirrus)
10th.	W. H. Holliday, Great Lakes Trainer. (Cirrus)

AMERICAN CIRRUS ENGINES, INC.,

WESTERN NEWS

SAN FRANCISCO BAY AIRDROME DEDICATED

THE formal dedication of the new San Francisco Bay Airdrome on Webster street, Alameda, was held August 16-17, according to a recent announcement of R. U. St. John, manager of the field.

The airdrome, which has been in operation since July 7, is a terminal for the planes of Western Air Express, West Coast Air Transport Corporation, Air Ferries, Ltd., and Varney Air Service. The field is used as well as an operating base for the Standard Oil Company of California, and by various other air concerns and private pilots.

The airdrome is equally convenient to the cities of San Francisco, Oakland and Berkeley, as well as Alameda, according to Mr. St. John.

The program of events included airplane contests and broadcasting from one of the thirty-passenger planes of Western Air Express. Assemblyman Roy Bishop was chairman of the dedication committee.

Rocket Experiments Will Be Conducted at Roswell, New Mexico

EXPERIMENTS in efficient rocket propulsion to reach extreme altitudes will be carried on in Roswell, New Mexico, according to a recent announcement of Professor Robert H. Goddard of Clark University, Worcester, Mass. Professor Goddard has chosen Roswell because of the climate, the nature of the country and the clearness of the air. The preliminaries attending the experiment will require considerable time and announcement as to when actual work will begin was not made.

The experiments have been carried on since 1912 with aid from the Smithsonian Institution, Clark University and Carnegie Institution. Daniel Guggenheim recently made a grant for the continuation of the work.

New Directors of Professional Pilots Association Elected

THE board of directors of the Professional Pilots Association was elected at the regular monthly meeting at the Association clubrooms, Hotel Teris, Los Angeles, August 5. Seven prominent airmen were chosen and will hold office, directing the operations of the association which is composed of 185 members, the great majority of whom are engaged in the aviation business in Southern California.

Members of the board include the following: Charles F. Dycer, Harold J. Lynch, Leslie C. Miller, W. D. Timm, D. W. Tomlinson, Roscoe Turner and Franklin Young, all of whom have been active in projecting the recently adopted policy of the association in which they advocate nation-wide adherence to a set of safety resolutions for all pilots and airlines.

INDEX TO NEWS ITEMS FROM WESTERN STATES, ETC.

Capt. Parker Pilot for W. A. E.

CAPT. ALTON N. PARKER, chief test pilot with Admiral Richard E. Byrd on the recent expedition to the South Pole and associate pilot on the flight over the North Pole in 1926, has signed a contract as pilot with Western Air Express. He has more than 3,000 hours in the air.

Captain Parker served with the Naval Air Forces during the World War and then engaged in commercial aviation until 1925 when he joined the Air Service branch of the United States Marine Corps. It was during this enlistment that he was chosen by Admiral Byrd to join the expedition to the North Pole.

Chairs of Aviation at U. S. C. Sponsored by W. A. E. and Richfield Company

TWO chairs of aviation education will be established at the University of Southern California, sponsored by Western Air Express and the Richfield Oil Companies. They are the Harris M. Hanshue Chair of Commercial Aviation, endowed by Western Air Express and named for its president, filled by Earl W. Hill, lecturer in the College of Commerce and Business Administration of S. C.; and the James A. Talbot Chair of Aeronautical Engineering, endowed by the Richfield Oil Company and named for the chairman of the board of directors, filled by James M. Shoemaker, professor in the College of Engineering of S. C., assisted by Captain Douglas Keeney.

The Hanshue Chair will make it possible for a student to pursue the study of commercial aviation as a major subject in the College of Commerce and Business Administration of the University of Southern California, providing a professorship which will supply instruction in principles of commercial aviation, air transport management, airport management, commercial aviation problems and aviation insurance.

The Talbot Chair provides a course in aeronautical engineering which follows the regular mechanical engineering course for the freshman year. It introduces into the program of mechanical engineering as early as the sophomore year a class in aircraft shop; into the junior year classes in airplanes and airships, meteorology, and principles of commercial aviation; and into the senior year aerodynamics, aircraft engines, aircraft communication, aircraft engine testing, propellers, aircraft engine design, aircraft structural design, airport management, and an aeronautics seminar, covering a study of current literature on aeronautical subjects.

These courses will begin wtih the fall semester on September 15. Shop and laboratory courses will be given at the flying field.

PACIFIC AIR TRANSPORT changed from a day to an over-night schedule southbound from Seattle to San Diego August 15 and will fly seventy per cent of total mileage at night. Passengers will be carried in the Boeing Hornet-powered mail four-passenger ships. This line is 1,200 miles in length. Flying time averages 108 miles per hour. Passengers and mail leaving Seattle at 7 p. m., reach San Francsco at 2:40 a. m., Los Angeles 6:35 a. m. and San Diego at 8:10 a. m.

Lighting of the entire airway was recently completed. There are now thirty-five weather reporting stations between San Diego and Seattle. Pacific Air Transport planes have Boeing radio telephone two-way voice communication.

PILOTS of Boeing System's Pacific Air Transport now wear uniforms which include overseas caps and Sam Brown belts. For each thousand hours of flight with P.A.T., the pilot is privileged to wear a gold star.

MISS BARNES SETS NEW SPEED RECORD

FLORENCE LOW BARNES piloted an airplane at an average speed of 196.19 miles per hour over a closed course at the Municipal Airport, Los Angeles, Calif., August 5. On this flight Miss Barnes apparently established a new international speed record for women, breaking the former record of 184.5 miles per hour set by Amelia Earhart last year at the Los Angeles Metropolitan Airport. The flight was timed by Joseph Nikrent of the National Aeronautic Association.

The flight was made over a measured one-mile course, and consisted of four one-mile laps. The highest speed reached by Miss Barnes on any of the four laps was 197.26 miles per hour. According to the United Press, she flew her plane 164 feet from the ground along the course after starting with a 1,500-foot power dive.

Solar All-Metal Transport Approved

A NEW all-metal transport plane received Department of Commerce approval July 30 when the Solar MS-1, an all-metal, eight-place cabin sesquiplane, successfully passed its final tests at Lindbergh Field, San Diego. The ship is powered with a single Pratt & Whitney Wasp engine.

All-metal construction was selected as affording the greatest economies in volume production, as well as reducing the maintenance cost to a minimum. In developing the Solar transport several new methods of metal construction were evolved.

Upon completion of the engineering design by the company's engineers, the performance analysis was checked by Prof. Elliot G. Reid of the Guggenheim aeronautical laboratory at Leland Stanford University. Upon receiving his confirmation of the calculated performance, a model one-twentieth the size of the completed plane was tested in the wind tunnel at New York University.

HEARST Aircraft, Ltd., has been organized at San Francisco, Calif., to distribute aircraft, operate an air transport service carrying passengers and freight, and give instruction in flying. George Hearst, publisher of the *San Francisco Examiner*, is president and treasurer of the corporation. The company is handling Stinson planes.

Uptown offices are in the Hearst Building, Third and Market Streets. Planes are displayed at Mills Field, San Francisco's municipal airport. A complete service station has been provided and a passenger depot is maintained.

The company will have ships available day or night for interstate or intrastate transportation. Frederick Kinley is in charge of this service.

Governor Young of California recently appointed Mr. Hearst State liaison representative between the State Department of Public Works and the aviation industry.

Transport Activities of Boeing System

THE number of passengers carried in July on Boeing System's Chicago-San Francisco and Seattle-San Diego routes was the largest since the company began operations three years ago, according to a recent announcement of officials of the company. Boeing Air Transport carried 482 tons, or thirty-eight and one-half million letters, on the Chicago-Oakland-San Francisco route during the first six months of this year, an increase of sixty tons, or six million letters, over the same period last year. The Boeing transcontinental mail increase is approximately fifteen per cent.

Flying every mile and trip scheduled, Boeing Air Transport flew 213,180 miles and made 110 night and day trips on the 1,938-mile airway between San Francisco, Oakland and Chicago in July. Air mail letters containing checks for clearing houses between Chicago and Pacific Coast cities arrived on the day scheduled during the twenty-five business days with only one exception.

USE of a new cowling on trimotor ships operated by Western Air Express has resulted in a decrease of fuel consumption and an increase in speed, according to a recent announcement of Clifford Mutchler, superintendent of operations of W.A.E. All planes operated by the company will be equipped with the new cowling, according to present plans.

The Operations of Western Air Express

INTERESTING information on the operations of Western Air Express is contained in a report recently issued by officials of the company. The report shows that the company's planes, carrying passengers, mail and express, average a total of 15,800 miles of flying daily; there is not an hour of the day or night when at least one of the company's planes is not in the air; a daily passenger and express service between the mainland and Catalina Island, twenty-five miles across the waters of the Pacific Ocean from the California coastline, is operated; planes fly from sea level crossing mountains, deserts, rivers and lakes; more than 5,000,000 miles have been flown without injury to a passenger; and through a subsidiary, Standard Flying Schools, the company has trained more than 1,600 pilots.

PANAMA

[J. F. H.]

RESIDENTS of the interior towns in the Republic of Panama have petitioned the Pan American Airways to establish a tri-weekly service between Panama and Colon with the larger inland cities which now are several days distant from the capital. In many instances the time in traveling is doubled because of poor weather. It is believed possible that the air mail contract could be secured for deliverance of mail to the inland cities where it is now delivered by truck tri-weekly, and oftentimes delayed.

There are many suitable landing fields throughout Panama, but the large trimotor Fords could not be handled with the greatest possible safety and a smaller ship has been recommended for the service which has met with the approval of the local officials and has been passed on to the main office for final consideration.

The present Canal Zone-to-Miami service stops at David, 250 miles north of Panama near the Costa Rican border, and serves a large portion of the republic. It is, however, unable to reach the larger section.

THE volume of air mail carried between Panama and the United States increased eighty per cent during the six months' period ending July 1, according to a recent announcement of officials. South American mail from Panama increased fifty per cent over the previous six-months' period.

CONTACTS

By FRANK E. SAMUELS

AN interesting event that drew a great crowd to the Los Angeles Municipal Airport recently was the swearing in of members of the Los Angeles Aerial Police force. Ten pilots sworn in included John Caris, Art Goebel, Waldo Waterman, Rosco Turner, R. B. Barnitz, Buddy Campbell, George Noville, Woodruff De Silva, W. E. Thomas and Paul E. Richter, Jr. Major J. C. Porter of Los Angeles officiated, assisted by members of the police force and the chamber of commerce. R. B. Barnitz is in full charge of this new addition to the Los Angeles police force.

ONE of the outstanding events in any of our outlying districts and one that drew the largest crowd that I have ever seen at the opening of a community airport was the two-day air festival and dedication of the Santa Paula airport, Saturday and Sunday, August 9-10. Over fifty planes from all parts of Southern California took part in the ceremonies. A great number of our leading pilots were present and the management did everything possible to help the visitors enjoy their visit. A number of air races were staged during the two-day meet and on Sunday the women pilots of the Tom Thumb Air Derby made the airport a one-hour lunch call. One of the features of the meet was the glider exhibitions of W. H. Bowlus in a Bowlus Sailplane. He took off from the mountain

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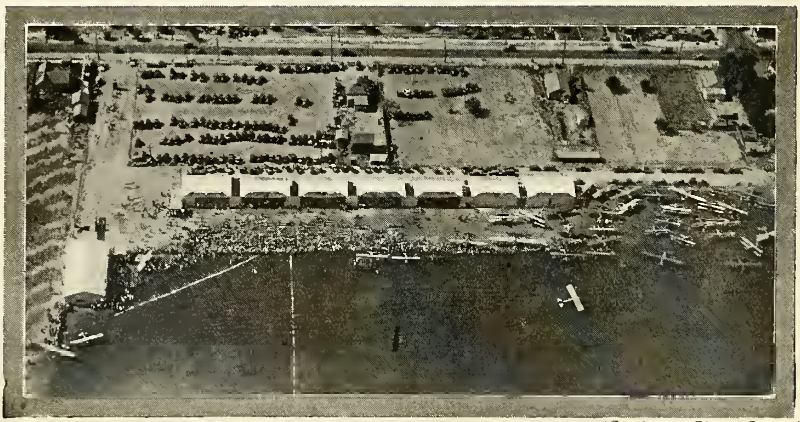


(*Southwest Photo Service*)

Santa Paula Airport during recent dedicatory ceremonies

(*Contacts continued*)

west of the airport. Another feature that deserves mention was the formation flying by cadets from the Hancock Foundation School of Flying. Balloon straffing and exhibition flying by noted pilots kept the crowd well entertained. A barbecue was served by the management both days to the visiting airmen and their friends. Passenger flying by the Standard Flying Schools, who by the way have a branch school at the airport, was held both days, lasting into the night.

UNIVERSITIES and colleges have, when application has been made, been approved by the U. S. Department of Labor, Bureau of Immigration, for the admission of non-quota students for the terms of their instruction. The California Aerial Transport, approved flying school, has been approved by the Department of Labor to instruct non-quota students. The Department of State has been notified of this action, for the transmission of the information to all American consular officers, who will then be in a position to consider applications for the required non-quota student visas.

AMONG the aviation concerns which have changed their operating bases to new locations during the month is the Pacific Airmotive Corporation. The company has moved its entire plant and is now settled in its great new building at the Los Angeles Municipal Airport. The building is of fireproof construction, one hundred and thirty-eight feet by two hundred feet—27,000 square feet of floor space, with a capacity of forty planes in addition to the space occupied by up-to-date, roomy and well-lighted repair shops and executive office. The company has installed several new machines, adding to and improving the equipment for the servicing and repair of Wright and Kinner engines. The corporation was organized a little over two years ago by Ross Hadley, W. E. Thomas and Palmer Nichols, and has had a steady growth and expansion, until today there are branches at Santa Maria, Calif., San Diego, Calif., Butte, Mont., and Seattle, Wash. In addition to the engine servicing department, the corporation handles a number of aeronautical products and accessories, including Eclipse generators and starters, Stromberg carburetors, Scintilla magnetos, Bendix brakes, Paragon propellers, Flightex fabric and Berryloid dopes and finishes. Ross, Tommy and Palmer, as they are known on the West Coast, are all well known and have enviable reputations among everyone connected with the industry here.

JAMES WEBSTER, formerly owner of Rogers Airport and Stearman distributor for Southern California, has given up his lease of the airport and moved his activities to the United Airport. Mr. Webster is one of the first airport owners in California. His old airport has been taken over by American Aircraft which will develop the field. When the improvements are completed, the field will be connected to the old American Airport, making one of the largest privately owned airports here.

THE Aero Brokerage Service Company is another firm that has found it necessary to move into larger quarters. The company has its operating base at the Los Angeles Municipal Airport, occupying hangar No. 1. Ed. L. Erickson and Lieut. W. B. Hawkins, operating heads of the service, inform us that their business is 'way ahead of their expectations. The demand for used planes is especially great.

W. E. (TOMMY) THOMAS has been chosen Western representative for Kinner engines. The deal was recently consummated between Thomas, head of the Pacific Aeromotive Corporation, and Robert Porter, president of Kinner.

CALIFORNIA

PACIFIC AIRMOTIVE CORPORATION, Los Angeles, Calif., distributor for Wright Aeronautical Corporation on the Pacific Coast, has been appointed authorized Kinner service distributor in the following territory: Washington, Oregon, California, Nevada, Idaho, Utah, Arizona, Montana, and Wyoming.

SAN FRANCISCO GLIDER CLUB members have solved the glider pulling grind by the use of a small Caterpillar Tractor. They found in a recent test that it would replace fifteen men on the leg-wearying job of hauling the glider up the hill to the starting point.

AIR-RAIL rates of Western Air Express from Los Angeles to points east were lower than the usual rates every Saturday morning during August due to a special railroad rate of fare and one-half for a round trip from Kansas City to points on the Atlantic seaboard, according to a recent announcement of George M. Lord, general passenger agent of W.A.E. The special rates charged by the Santa Fe every Saturday morning during August affected the transcontinental rates of the air company. Savings as much as $25 for an air-rail trip from Los Angeles via W.A.E. facilities to New York resulted from the special fare.

TOTAL expenditures of $187,491 have been made for improvements at the municipal airport, Los Angeles, Calif., since the 640-acre tract was purchased in 1928, according to a recent announcement of Colonel Richard B. Barnitz, director of the airport.

Included in the costs of improvements is the lighting system, $34,689; the building of runways and taxiways, $29,095; and the construction of a hangar, $60,980.

The field is located approximately thirteen miles from the business district of Los Angeles.

Revenues have been obtained at the field through leases of storage space. The expenditures still exceed the income, according to Colonel Barnitz, but it is expected that within a short time the project will be placed on a paying basis.

ASSOCIATED Air Services of San Francisco, Calif., have been appointed distributors for Fleet Aircraft, Inc., for Northern California, according to a recent announcement of R. W. Fulton, sales manager of the Fleet company. Delivery of five Fleet sport planes was recently made to the Associated company.

SIX new dealers have been appointed by the Stinson-California Company of Burbank, Calif., within the past thirty days, according to a recent announcement of William A. Mara, vice president of the Stinson corporation. The total number of Stinson dealers on the West coast is thirteen, including the six new dealers.

Six planes have been ordered by the Stinson-California Company for immediate delivery, bringing the total sold by the West Coast branch to twenty-nine since March 1.

The Stinson-California Company is a factory branch of the Stinson Corporation.

THIRTY engines were shipped during July by the Kinner Airplane and Motor Corporation of Glendale, Calif., according to a recent announcement of company officials. Sales of engine parts and replacements are increasing steadily.

The American Aeronautical Corporation, manufacturers of the Savoia Marchetti, recently received from the Department of Commerce Approved Type Certificate 336 covering model S-56, a three-place amphibion, powered with the Kinner B-5 engine of 125 horsepower.

ALAMEDA
[H. V. WALDORF]

THE Curtiss-Wright Alameda airport was opened as a commercial airport August 1. The action followed the moving of the Curtiss-Wright Flying Service to the San Mateo airport.

Since its establishment, the Alameda airport has limited commercial operations to planes of the Curtiss-Wright service or the T. A. T.-Maddux Airlines.

R. R. Nickerson has been named superintendent of the airport. Jack Jacques is assistant.

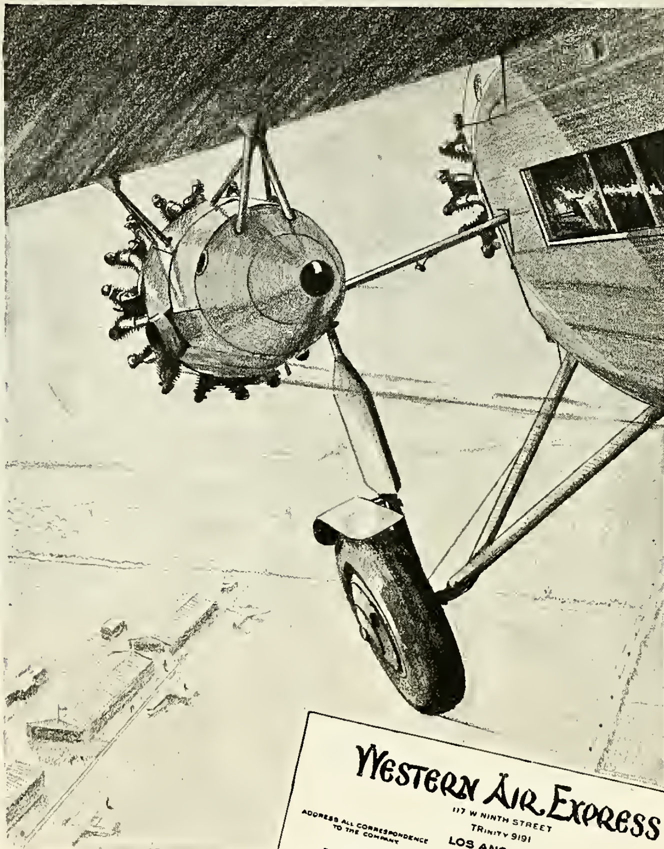
FLYING the Diesel-Bellanca which he plans to use in traveling between missions in Alaska, Brother George J. Feltes arrived at Curtiss-Wright Alameda airport August 1 from New York. He plans to leaves for the north in September.

ABATHING beach, including a bathhouse which will accommodate 600 bathers, has been opened at Curtiss-Wright Alameda airport.

THE Varney Air Service and the American Air Cab Company have transferred their San Francisco Bay bases from Oakland Municipal Airport to the San Francisco Bay Airdrome.

THE Oakland Flying Service Lt., has been formed at Curtiss-Wright Alameda airport. The company will specialize in

(*Continued on next page*)



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"NO Western Air Express passenger plane has ever made a forced landing on account of motor trouble and we attribute this largely to the excellence of Richfield Aviation Gasoline"

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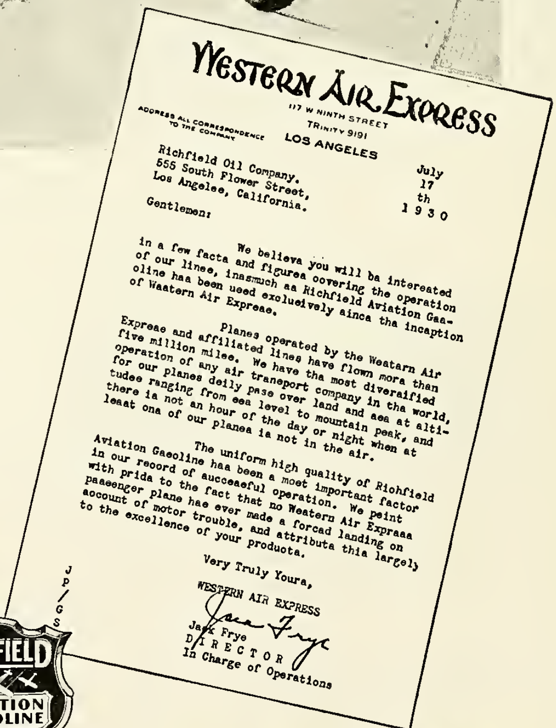
Use Richfield in your own flying equipment ...get the famous flying qualities that have made it the choice of the world's greatest pilots... the nation's greatest air lines. Ask for Richfield by name.



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(California News continued)
student instruction and sightseeing flights. Jack Worthington is president.

MAJ. PAUL FERRON, former pilot of the Air Corps, has established the Ferron Glider School at Berkeley Municipal Airport. Fifteen students of the University of California have enrolled for instruction.

THE Aerial Express Corporation operating between Los Angeles and Seattle, has made San Francisco Bay Airdrome its San Francisco Bay region port of call. Ryans are used.

OAKLAND

STUDENTS at the Boeing School of Aeronautics at Oakland flew one-quarter of a million miles during the first six months of 1930, according to a recent announcement of officials of the company. The average number of miles flown per school day was 2,115. Instructors completed 3,242 hours in the air with students during this period.

R. M HARRIS, University of Washington, winner of a W.E. Boeing scholarship at the Boeing School of Aeronautics, learned to solo in eight hours in his private pilot course included in the scholarship. Ralph J. Moore, Stanford University, who won the Boeing Master Pilot course, valued at $5,250, including 200 hours of flying and 924 hours of ground school, will enter the fall class at the school.

BOEING School of Aeronautics has designated the following dates for the opening of the terms for 1930-31: Fall, September 22; Winter, January 5; and Spring, April 6.

[H. V. WALDORF]

Claims New Light Plane Record

A NEW world's altitude record for single-place planes weighing less than 440 pounds was claimed by F. M. Johnston, factory representative of the Aeronautical Corporation of America, following a flight over Oakland Municipal Airport July 30.

Flying an Aeronca and carrying five gallons of gasoline, Johnston climbed for nearly three hours. His altimeter failed to function after reaching 15,200 feet, he reported. The official world's record is 13,254 feet, held by Lieut. Z. A. Kocjan of Poland. Johnston's barographs were sent to Washington for calibration.

THE operations report for July at the Oakland Municipal airport showed 5,642 student landings, 5,271 passengers, and 2,366 transient, air taxi and transport landings.

THE full Navy program was followed during the two-week active training period of the Oakland Naval Reserve squadron. The training work was given at Oakland Municipal Airport and at a temporary field and target range near the north end of San Francisco Bay.

The training included aerial gunnery, bombing, radio, blind flying, formation flying and night flying. The bombing was done from a 4,000-foot altitude. A 600-foot wooden battleship target was used. Lieut.-Comdr. F. B. Connell was in charge. Fifteen officers and thirty-five men participated.

CONSTRUCTION work is under way at Oakland Municipal Airport on a two-story addition to the Naval Reserve Squadron headquarters in Hangar No. 3. Offices and a lecture room will be located in the squadron.

RECORDS of flying and ground schools at Oakland Municipal Airport showed a total of 425 students enrolled July 30.

CONTRACT has been let for 5,000 yards of rock to be used in extending the surfaced area at Oakland Municipal Airport.

REED VOWLES has established a flying school and air taxi service at Oakland Municipal Airport.

DICK FREGULIA has been appointed chief pilot of the Elliott and Duck Flying Service at Oakland Municipal Airport. Ted Blackburn has replaced Fregulia as chief pilot of the Fillmore Flying Service.

A GLIDER training camp has been established at Warm Springs, about twenty miles south of Oakland Municipal Airport. Exhibition flights are given each Sunday.

DOLORES GUINTHER has been named president of the Hurley Flying Service at Oakland Municipal Airport.

SAN DIEGO

[L. M. EARL]

A COMPANY which will manufacture a sailplane is being organized by Jack Barstow, holder of the world's unofficial gliding record of fifteen hours and thirteen minutes. The company will be known as the Barstow Soarers Company.

Capt. Robert E. Pollock, formerly general manager of the Bowlus Sailplane Company, Ltd., is manager of the company. Mr. Barstow will also have associated with him in the new company technical experts who have been identified with the aviation industry and who have given special study of soaring planes and gliders.

While the company expects to locate its factory in San Diego, no definite decision has been made as yet.

THE Peaches Wallace Glider Airport was dedicated at Emerald Hills, San Diego, on July 27. The dedicatory ceremonies were opened by Miss Ruth Alexander, who flew over the field escorted by a formation flight of students from the T. C. Ryan Flying School. Six primary gliders and two sailplanes were on the field and a score of glider pilots competed for different prize awards. Ten events were run off in addition to a special soaring demonstration made by Bud Perl. More than sixty launchings and flights were made. Wm. Van Dusen, N. A. A. official, and Dr. Kumm, president of the Glider Association of California, acted as judges.

STUDENT activities at the T. C. Ryan Flying School in San Diego include a weekly contest open to all solo students who are classed in accordance with the number of solo hours. Winners of this contest must show the highest grade for proficiency in all maneuvers as designated by the chief flight instructors. The winner of three contests is awarded a medal. The following students have received this award: Verne Byrne, Cecil Phillips, Percy Bell, James Fornasero, M. F. Chappell and Leslie Earl.

THE T. C. Ryan Flying School, San Diego, has taken delivery on a carload shipment of five new Great Lakes Sport Trainers. This is the second carload of these planes ordered by the school in the past ten weeks. Four of these plane purchases have been made by Ryan students who received their primary training in Great Lakes trainers, standard equipment of the Ryan Flying School. Two planes were purchased by flight officers of the Naval Air Service and Marine Corps for their personal use.

A NEW boulevard along the eastern boundary of Lindbergh Field, San Diego, is being laid and will be open soon. In building the road it was necessary to move a 50x100-foot hangar of the Airtech School of Aviation, changing it ninety degrees in direction. The move was made in three days. The hangar was moved at a cost of $585.

FIRST combination sailplane-glider in the United States to receive Department of Commerce approval was accredited to San Diego recently when Government inspectors awarded a certificate to the Bowlus sailplane. It was designed and built here by W. Hawey Bowus.

Designed like the Bowlus sailplane in which Jack Barstow remained aloft over Point Loma for fifteen hours, to establish the world's endurance record, the combination plane may be converted into a primary or secondary glider or into a sailplane, Bowlus said.

To make a soarer of the sailplane the characteristics of the secondary glider are retained but the landing gear is removed. The sailplane then may be launched with a shock cord. Bowlus also has invented a canvas fuselage so the sailplane may land on water.

IDAHO

[G. PERRINS]

INSTALLATION of the border and approach lights at the Idaho Falls municipal airport was completed recently, together with the large rotating beacon. Automatic switches have been ordered by the city to turn the airport lights on and off each night and morning, according to T. R. Peters, city purchasing agent. The port will be lighted each evening.

BURLEY, Idaho, recently celebrated the official opening of its airport.

Photograph, Airview, Inc.

Three Aeromarine-Klemm ships that are setting new low maintainance records.

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maintaining training ships

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The Aeromarine-Klemm "85" . . . ideal sport-trainer that experienced schools prefer for its safety features and extreme ease of control.

NORTHWEST

[F. K. HASKELL]

Western States Aeronautic Association

THE open meeting of the Western States Aeronautic Association is scheduled to be held at Portland, Ore., December 5, according to a recent announcement of J. B. Wood, commissioner of public works for Idaho and chairman of the association, and Frank McKee, director of aeronautics for the California State Chamber of Commerce.

Governors or their official representatives from the eleven western states will be the only voting members of the conference. The Post Office Department, the Aeronautics Branch of the Department of Commerce, the Army and Navy, the Aeronautical Chamber of Commerce, the National Aeronautic Association, manufacturers and operators of aircraft and the representatives from airports and aviation committees have been invited to attend the meeting.

The purpose of the association is to study the needs of the aviation industry within the states and to coördinate the various Federal and State agencies in promoting uniform development of commercial aviation. The specific object of the association is to promote uniform legislation, interstate airways, uniform taxation to get away from the vexation caused in the early history of the automobile, and to work with Federal authorities in the development of aviation.

Don R. Van Boskirk, chairman of the aviation committee of the Junior Chamber of Commerce, and A. C. Albrecht, manager of the committee, were asked to arrange for all those connected with the industry in Oregon to attend the meeting. Frank McKee will handle that work for California.

The Western States Aeronautics Association includes Oregon, Washington, Idaho, Montana, Utah, Nevada, Wyoming, California, Arizona, Colorado and New Mexico.

THE Model Aircraft Club of Sedro Woolley, Wash., has been organized. The officers and personnel will shortly be announced.

A. A. BENNETT, who recently organized the Bennett Air Transport Company in Tocoma, Wash., will inaugurate a passenger express and mail service between Tacoma and Portland, via Olympia, Chehalis and Longview. Mr. Bennett, Charles A. Button, secretary-treasurer of the company, Richard B. Harris and L. E. Wilkeson, manager of Tacoma airport, are associated with the new line.

H. HOBI of the Hobi airways will use the Tacoma, Wash., airport as headquarters for an aerial sightseeing service around Mt. Rainier. He plans to use a six-passenger cabin plane with a cruising speed of 110 miles per hour.

THE new flying field of the Washington Glider Association was recently opened at Seattle, Wash. Otto Vieweg is president of the association, which has thirty members and owns two modern type of gliders.

WASHINGTON

[C. M. LITTELJOHN]

THE Greenwood Flying Service has been incorporated at Vancouver, Wash., capitalized at $10,000. Incorporators are R. C. Sugg, Al Greenwood and E. G. Cushing.

Northwestern Air Tour

THE Northwest air tour was held during the first part of August with thirty planes participating. The route of the tour extended through Washington, Oregon and Idaho, stopping at twenty-four cities. The following cities were included in the itinerary: Yakima, Pasco, Spokane, Moscow, Clarkston, Lewiston, La Grande, Baker, Pendleton, Portland, Tillamook, Salem, Springfield, Medford, Silverton, Corvalis, Kelso, Chehalis, Seattle and Port Angeles. Various cities posted prizes and cash awards for the winners of aerial events held in conjunction with the tour. The tour was sponsored by the National Aeronautic Association and was held under the auspices of the Pacific Northwest States Air Tour Association.

ANSCEL C. ECKMANN has been promoted from chief pilot to operating manager of the Alaska Washington Airways of Seattle. He had been chief pilot of the company since it was established more than a year ago, when he made the first non-stop flight from Seattle to Juneau, Alaska, to usher in the passenger service between the two cities. Mr. Eckmann succeeds Wing

(*Continued on next page*)


First again!
The First "Approved Type Certificate" for parachutes issued by the U.S. Dept. of Commerce, Aeronautics Branch, has been Awarded to:
Russell "Lobe" Parachute
Under the unbiased, critical eyes of expert Government Officials the Russell "Lobe" Parachute has triumphantly withstood a series of the most exacting tests ever placed upon a modern piece of aerial life-saving equipment.
These tests, conducted by the Department of Commerce, Aeronautics Branch, under a law recently enacted by Congress, were designed to uncover any possible defects in design, workmanship, materials or efficiency. Many of the tests were made under conditions that were far more severe than will be encountered in actual emergencies.
As a result of these exhaustive tests, the Department of Commerce, Aeronautics Branch, has awarded its first "Approved Type Certificates" to the Russell "Lobe" Parachute—*the parachute that has never failed to open in an emergency and bring its load safely to the earth.*
THESE "CERTIFICATES OF APPROVAL" APPLY TO THE FAMOUS RUSSELL "LOBE" PARACHUTE OF *cotton* MATERIALS AS WELL AS THE RUSSELL "LOBE" PARACHUTE OF *silk* MATERIALS.
Russell Parachutes are available in convenient "quick-attachable" packs for cabin planes; "detachable back pads" for open cockpits; also lap, seat and back packs. Prices range from $250 up. Send for descriptive folder.
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EASTERN SALES OFFICE 122 E 42nd ST. NEW YORK

(*Washington News continued*)
Commander W. E. Wynn, who recently resigned to accept a position with the California air transport system.

W. E. Goodwin, formerly of the Sand Point Naval Base near Seattle, will head the mechanical division of the company.

CAPITALIZED at $10,000, Washington Air College was recently incorporated at Tacoma, Wash., to distribute airplanes, automobiles and other motor vehicles and to conduct a flying school. Incorporators are Warren Brown, Jr., and Norman M. Littell.

A NEW air express service has been started between Seattle, Portland, Oakland and San Francisco by the Aerial Express Corporation, Ltd.

LIEUT.COMDR. HOWARD A. BESWICK is now second in command of the Thirteenth Naval District's Naval Air Reserve at Sand Point, Seattle. He recently received his appointment as lieutenant-commander.

OREGON

[J. C. BROOKS]

THE law of Oregon permits a pilot who has had fifty hours of solo time to take an examination for an Oregon State Pilot's license. This license permits a pilot to fly any place in the State of Oregon in a plane under an Oregon license for pay.

So far as can be determined from a check of school records, every student who has completed a course containing fifty solo hours at the Tex Rankin Flying School and who has taken out an Oregon State license, has obtained a position as pilot. Also, to date, there has never been a graduate of the school who enrolled for a course containing fifty solo hours that has failed to pass the examinations for an Oregon State Pilot's license.

All student flight instruction is under the personal supervision of Tex Rankin.

The Portland Airport

THE Portland, Oregon, Airport was dedicated nearly three years ago. Located on Swan Island in the Willamette River, the port contains 253 acres, is thirty-three feet above sea level, and nine feet above low water. It covers the entire island except where it has been connected with the mainland by a fill. The island has been filled and leveled.

Lack of fog favors the Portland airport, according to the management. The city is shut out from air view many times, yet visibility from the air is fair at the port. This may be due partly from the fact that high bluffs are on both sides of the river.

Space is let to seven air companies on the field: West Coast Air Transport, Pacific Air Transport, Varney Air Lines, McKenzie-Morrow Aviation Co., Hans Mirow Flying Service, Shields Flying Service, and Portland Airways, Inc.

Schools are operated by a few of these, among which are Shields Flying Service, which, since it began on the Portland field, has instructed almost 300 students with no fatal accidents, and few accidents of minor quality. Les Meadows is instructor and E. R. Smith is chief mechanic and ground instructor.

At present there are ten students taking instruction at the Shields Flying School. The textbooks are the Thorpe Cadet System.

Eleven lights surround the landing field, making it ideal for night flying. They are 3,000-watt, and are proving very satisfactory. Obstructions are marked.

Taxi areas and hangar aprons are constructed of asphalt paving. Landing runways are macadamized and the take-off runways are hard surfaced with Gasco binding and crushed rock. All gas pits and wiring are under ground, and complete servicing is available on the field.

C. O. Lovas is field superintendent and F. J. Moffett is assistant.

In the administration office at the Portland Airport there are offices for the Department of Commerce inspector, weather bureau reporter, airport administration and passenger depot.

The schools are allotted reserved space.

A COMBINED total of 1,400,000 miles of flying was recently completed jointly by Tex Rankin, Art Walters and Dick Rankin. Tex Rankin completed more than 6,000 hours in the air in the twelve years he has been a pilot, flying a total of more than 600,000 miles; Art Walters, whom he instructed eight years ago, completed 4,000 hours, or 400,000 miles; and Dick Rankin has 4,000 or 400,000 miles in the air. The three fliers are instructors in the Tex Rankin School of Flying, Portland, Ore.

UTAH

[G. PERKINS]

Proposed Administration Building at Salt Lake Airport

INTEREST in aviation is growing in Utah, a state with thirty airports—twenty-two of which are intermediate ones, four municipal and four auxiliary ones.

Plans to secure the construction of an administration building costing from $50,000 to $75,000 at the Salt Lake Airport were discussed recently by the aviation committee of the chamber of commerce. The building would house a postoffice, a restaurant, a hospital and a large waiting room. The various airline companies would occupy considerable space for offices to help defray the cost of construction and maintenance of such a building.

Other improvements to the airport planned include the enlargement of the field and the cementing of the runways. Work of leveling and raking the ground at the airport has been started.

A NEW contract for carrying air mail between Salt Lake, Pocatello, Great Falls and Butte has been awarded to the National Parks Airways by the Government, according to Alfred Frank, president and manager of the company. The National Parks line is now flying 1,600 miles a day.

PLANS for the erection of an airport at Prova are progressing and the city will soon have an excellent field, according to present plans. The site has been selected and a hangar will be built.

COLORADO

[I. R. ALEXANDER]

THE meeting of 200 airport managers, scheduled for Denver August 4 and 5 to discuss airports for cities throughout the eight Western and Southern States, has been postponed until September. This announcement was made recently by Charles W. Short, Jr., Tulsa, Okla., chairman of the south central section, Aeronautical Chamber of Commerce.

"The aviation business is so heavy this summer," Mr. Short said, "that many who wish to attend the Denver meeting have written in, asking us to postpone it until fall. These men will come here from Colorado, Oklahoma, Kansas, Texas, New Mexico, Arkansas, Louisiana and the western half of Missouri. I recommended Denver for the meeting because I want the city officials and chamber of commerce representatives of cities throughout this section to see Denver's municipal field. It is the second in the United States to receive an A-1-A rating by the Government, and is one of the finest in the entire world. The meeting is to give information and to help cities desiring to build their own ports."

THE feasibility of a proposed air route from Grand Junction, Colo., to the Eastern Slope will be decided within a short time. The plan is to join Delta, Montrose and other points on the Western Slope into a chain of airports and these to be linked with Denver. Earl E. Ewing, postmaster at Colorado Springs, accompanied by O. M. Moser, president of the Pikes Peak Air Commerce, Inc., are expected to decide the possibility of such a plan after visiting Grand Junction and other cities on the Western Slope. The air route will be used for transportation of passengers, mail and express.

IT was recently announced that within a short time Mid-Continent Air Express of Denver will take over operation of the Western Air Express Amarillo-Wichita Falls-Fort Worth-Dallas passenger airline. Mid-Continent Air Express at present operates daily service between Denver and Amarillo. Under the new arrangement, Mid-Continent, with headquarters in Denver, will operate straight through from Denver to Dallas. The change in management was announced by Capt. Charles W. France, superintendent of operations for Mid-Continent, who will have charge of the new line. The change will add approximately 20,000 miles of flying per month to the schedule of the Denver planes, making a total of 18,000 miles each month. Mid-Continent has sufficient equipment to operate the new line, according to Capt. France, who declared that two additional pilots will be employed at once.

AERONAUTICAL INDUSTRY

ENGLAND-CANADA AND RETURN FLIGHT OF R-100

EXPERIENCE with lighter-than-air craft as a practical means of long-distance, over-water aerial transportation was augmented last month by the 6,500-mile flight of the British airship R-100 from Cardington, England, to Montreal, Canada, and return. This airship is the fourth to cross the North Atlantic; previous flights were made by the British airship, R-34, England to the United States; the *Los Angeles*, Germany to the United States; and the *Graf Zeppelin*, which crossed the North Atlantic six times.

On the East-West crossing, the R-100 landed at St. Hubert Airport, Montreal, August 1, after a flight of seventy-eight hours and forty-nine minutes from Cardington where the airship took off July 28. On the return journey, the R-100 took off from Montreal August 13 and docked at Cardington August 16, completing the West-East flight in fifty-six hours and twelve minutes at an average speed of fifty-eight miles per hour. The R-100 established a speed record for a westward Atlantic crossing by airship. The former record of approximately eighty-one hours was made by the *Los Angeles* from Germany to the United States in 1924. This flight was 1,500 miles longer than that of the R-100.

When the R-100 took off on the flight to Montreal there were on board 34.8 tons of fuel and fifty-four tons of ballast. Forty-four persons were carried. The airship was under the command of Squadron Leader R. S. Booth. Thirty tons of fuel were used on the westward flight. The airship moored with about five tons in the tanks.

The importance of radio and meteorological organizations in lighter-than-air operations was demonstrated conclusively on the flight of the R-100. Weather conditions on both crossings varied from heavy tail winds to head winds, and fog, rain and calm were encountered. Speeds ranging from fifteen to 100 miles per hour were obtained. On the westward flight, squalls in the vicinity of the St. Lawrence Valley damaged the fabric which was temporarily repaired in the air. Weather information, without which it is generally agreed that airship navigation is not a practical proposition, was obtained by radio from Cardington, Greenland and surface ships on the Atlantic.

This flight, according to the Air Ministry, was undertaken as "part of the Ministry's development policy for airships with the object of testing out the reliability and behavior of the airship on a long-distance flight. Data will also be acquired which will be of value in deciding upon future policy with regard to the development of airships for commercial purposes, with particular reference to speeding up communications among the British commonwealth of nations."

Canada's contribution to the establishment of transatlantic intercolonial airship service by the British Empire is a mooring mast 208 feet high constructed at a cost of $750,000. This mast received one of its first practical tests when the R-100 docked at the St. Hubert Airport.

The flight was of especial importance from a technical point of view as it put to the test a new theory of airship design and construction. The R-100, at present the world's largest airship, differs basically in construction from the normal Zeppelin type. In general, the R-100 and her sister ship, the R-101, differ in their length and diameter ratios from the *Graf Zeppelin*, the British ships being shorter and fatter than the German. British designers believe that as airships increase in size, a stumpier shape will insure greater stability and general airworthiness. Complete data on the flight of the R-100 is expected to show definitely the advantages of the one type of airship over the other.

The R-100 was constructed at a cost of $2,250,000 and required three years to complete. The dimensions are as follows: Length, 719 feet; diameter, 133 feet; actual displacement, 156 tons; high speed, 81 miles per hour; cruising speed, 71.5 miles per hour; carrying capacity, 100 passengers and one ton of cargo; and range, 3,600 miles at cruising speed with full load. The airship is powered with six Rolls-Royce Condor engines developing a maximum of about 4,200 horsepower.

Construction of ZRS-4 Half Completed by Goodyear-Zeppelin Corp.

CONSTRUCTION of the ZRS-4, which will be the world's largest airship when completed, has passed the half-way mark, according to a recent announcement of officials of the Goodyear-Zeppelin Corporation, Akron, Ohio, which is building the airship for the United States Navy Department. This airship, which is nearly one-third larger than the R-100, will have a capacity of 6,500,000 cubic feet of gas as compared with the 5,150,000-cubic-foot capacity of the British airship.

The R-100 has cruising radius of about 6,000 miles, but the ZRS-4 will be able to fly 10,580 miles without refueling.

In the ZRS-4 there will be an airplane hangar, housing five fast fighting planes for scouting or protective purposes.

Because inflammable hydrogen is the lifting gas in the R-100, the British dirigible's motors must be hung outside the hull of the ship. Eight motors, with shafts running to propellers outside, will be inside the hull of the helium-inflated ZRS-4. These propellers will have a swivel arrangement so they may be used either to push or pull, raise or lower the big gas bag.

The ZRS-4 is scheduled for completion by June, 1931, at a cost of $5,375,000. A sister ship, the ZRS-5, costing $2,450,000, probably will be finished in the latter part of next year.

WORLD'S REFUELING ENDURANCE RECORD EXCEEDED AGAIN

COMPLETING a new world's refueling endurance record of 647 hours, twenty-eight minutes and thirty seconds, Dale "Red" Jackson and Forrest O'Brine landed at Lambert-St. Louis Field, St. Louis, Mo., August 17, after twenty-seven days in the air. The flight, made in the monoplane *Greater St. Louis*, exceeded by ninety-three hours and forty-seven minutes the former world's record set by the Hunter brothers July 4 at Chicago.

A broken crankcase which sprayed oil over the plane brought the flight to an end, according to their report made upon landing. They had planned to remain in the air for

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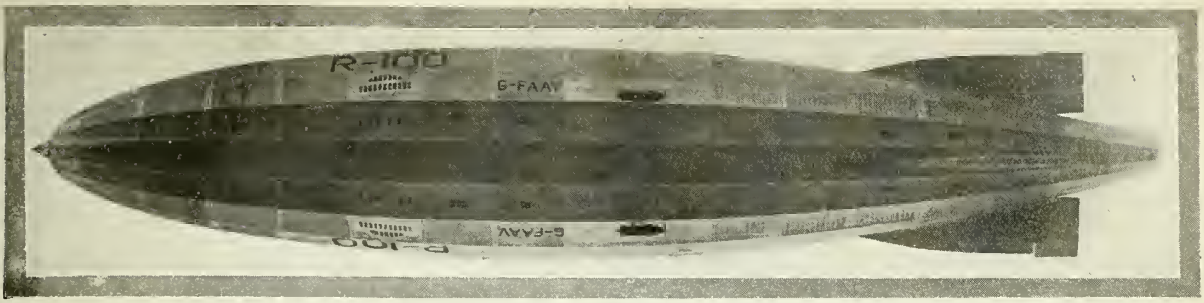


(P & A Photo)

The British dirigible R-100 in the air above Montreal, Canada, as seen from below on a cross country flight

at least 1,000 hours.

On August 15, Jackson and O'Brine tied the world's endurance record of 553 hours, forty-one minutes and thirty seconds established by the Hunter brothers. Shortly before the Hunter record was equalled, the endurance plane made its 121st contact with the refueling plane, *Patsy Ann*, taking aboard about sixty-five gallons of gasoline. The endurance plane was equipped with radio and the pilots broadcast frequently throughout the flight.

The flight was a private venture financed by the two pilots and by means of public subscription. The *Greater St. Louis* is the same model and the engine the same type used in the *St. Louis Robin*, the plane in which Jackson and O'Brine established a world's endurance flight of seventeen and one-half days last year. This record stood until broken by the Hunter brothers.

Establishes Non-Refueling Endurance Record in Amphibion

A WORLD'S non-refueling endurance record of twenty-two hours, eighteen minutes and thirty-two seconds was established August 10 by William Atwater in a single-engined Savoia-Marchetti amphibion, taking off and landing on the water. The plane took off with a total load of more than 2,600 pounds including 182 gallons of fuel.

Atwater made the flight at Manhasset Bay, Port Washington, L. I. He is a pilot for the American Aeronautical Corporation, manufacturers and distributors of the Savoia-Marchetti ships. The flight began at 3:03 p.m., August 9, and ended at 1:22 p.m., August 10.

There was no former official time for an endurance flight by an amphibion. The former light seaplane record was sixteen and one-half hours. The flight was observed by Walter D. Ward and R. J. Barbin of the National Aeronautic Association. Instruments used on the flight have been sent to Washington, D. C., for official homolgation.

Limit Participation of Air Corps in Airport Dedication Ceremonies

ARMY Air Corps aircraft will not be authorized to attend dedications of airports in localities of less than 50,000 population, according to a recent announcement of Assistant Secretary of War F. Trubee Davison. Increasing demands for Army Air Corps attendance at municipal airport dedications are hampering training schedules and Air Corps tactical development to such an extent that the War Department, in the interest of military efficiency, has found it necessary to place a curb on the sending of Army planes to airport openings.

THE 1930 NATIONAL AIR TOUR

THE National Air Tour of 1930, which is the sixth annual contest for the Edsel B. Ford trophy, will start at Detroit, Mich., September 11 and return September 27. Sixteen days will be spent en route, covering a distance of 4,500 miles and visiting thirty-two cities in eighteen states and three Canadian provinces.

This year the tour formula has been changed to bring the ships closer in their standings each day. The new formula is based on plane weight, horsepower, carrying capacity and landing and take-off time, and provides a premium for piloting and navigating. Previously the maneuverability of the plane in landing and taking off was given greatest consideration.

This year for the first time the Light Plane Trophy donated by the Great Lakes Aircraft Corporation, Cleveland, Ohio, will be awarded. The trophy is to be contested for each year by planes with an engine displacement of 510-cubic inches or less, and will be awarded to the ship having the highest score under the system of scoring by the National Air Tour formula and which shall have complied with all the rules and regulations of the National Air Tour. The Great Lakes Light Plane trophy shall become the permanent property of any manufacturer who shall win it on three consecutive occasions and shall not without his approval be again contested for.

The following tentative route has been chosen: Battle Creek, Chicago, Davenport, Rockford, Wausau, Eau Claire, St. Paul, Grand Forks, Winnipeg, Brandon, Regina, Moose Jaw, Saskatoon, Edmonton, Calgary, Harve, Great Falls, Miles City, Rapid City, Cheyenne, Denver, Colorado Springs, Garden City, Wichita, Enid, Kansas City, Springfield, Terre Haute, Cincinnati, Columbus, Fort Wayne and Detroit.

Captain Frank Hawks will be referee; Capt. Ray Collins, tour manager; E. W. "Pop" Cleveland, official starter; and Lee Shoenhair, assistant scorer. William B. Mayo is chairman of the 1930 National Air Tour Committee.

The scoring in the tour for the past two years has been in favor of the Waco Airplane Company, Troy, Ohio. If the trophy is won by them this year they will gain permanent possession. A Waco piloted by John Livingston won the event last year. Approximately $15,000 in cash prizes will be awarded to planes obtaining highest scores.

The National Air Tour is sanctioned by the National Aeronautic Association and sponsored by the Detroit Aviation Society.

U. A. T. C. Report Shows Profits

STATEMENT of the United Aircraft & Transport Company for the quarter ended June 30 shows a new profit of $1,202,140 after charges and minority interest, Federal taxes, etc., as compared with a net profit of $2,606,034 in the corresponding quarter in 1929.

Net profit for the first six months of this year amounted to $2,102,531 after taxes and charges. In the first half of last year, the net profit aggregated $4,410,046.

Unfinished business on June 30 was substantially higher than at the beginning of the fiscal year, and indications point to improved volume and earnings for the final quarter, the company reports.

Sergievsky Sets New Record

CAPTAIN BORIS SERGIEVSKY, chief test pilot of the Sikorsky Aviation Corporation, broke a world's seaplane altitude record which he had previously established, when he climbed to an indicated altitude of 21,000 feet on a flight at Bridgeport, Conn., August 11. He carried a load of 2,000 kilograms (4,409.24 pounds). This mark exceeds by approximately 2,000 feet the record he established in this category March 6 at North Beach, L. I.

Capt. Sergievsky used a Sikorsky S-38 amphibion with the wheels removed and powered with two Pratt & Whitney supercharged 420-horsepower Wasp engines. On the flight in March he used two Pratt & Whitney 525-horsepower engines. He did not carry oxygen on his record-breaking flight last March, but did so on the most recent one, and said it aided him greatly at his top altitude. He was in the air one hour and twenty-six minutes.

The altitude record for landplanes with the same load is 20,544 feet, made by De Monico Antonini of Italy in a Caproni plane, May 26, 1927.

This is the sixth world record Sergievsky has made in less than six months, all being speed and altitude performances for seaplanes with loads by the same model plane.

AIRCRAFT PRODUCTION, FIRST HALF 1930

A TOTAL of 1,684 airplanes were manufactured in the United States for civil and military use in the first six months of 1930, according to a recent announcement of the Aeronautics Branch of the Department of Commerce. Of this number, 1,325 aircraft were manufactured for commercial use and 359 military aircraft were delivered to the Army and Navy. Of the aircraft produced for civil use since the first of the year, 148 were exported. Sales kept pace with production.

These estimates are based on a record of Department of Commerce licenses and indentification marks issued up to August 1 to the aircraft manufactured since January 1, 1930. There is a possibility that there still may be a few aircraft for which licenses or identification marks have not yet been sought and that these aircraft were produced during this period but were not, therefore, included in the report.

Production and sales of airplanes in the second quarter of 1930 showed a decided improvement over the first quarter of this year, according to reports of the first six months of 1930, made public recently by the Aeronautical Chamber of Commerce of America, Inc. Production of aircraft engines in the second quarter exceeded that of the first three months by 252 units. A total of 2,052 aircraft engines were manufactured during the first six months by nineteen aircraft engine manufacturers reporting to the Aeronautical Chamber.

Production and deliveries of commercial airplanes sold during the first half reached their highest peak in February. Deliveries on military airplanes sold reached their peak in February. The greatest production was reported in April and June. Production of commercial aircraft in the first six months of 1930 was approximately thirty-eight per cent. of production for the same period in 1929, which was a peak year; military production for the first half of 1930 was approximately sixty per cent of that for the same period in 1929.

Fifty-eight aircraft manufacturers reporting to the Aeronautical Chamber of Commerce produced 785 commercial and military airplanes valued at $6,475,992.92, without engines, during the second quarter of 1930, as compared with 630 planes valued at $4,570,063.36, without engines, in the first quarter. During the first half of this year these manufacturers produced 1,415 airplanes valued at $11,046,056.28, without engines. This is in comparison with the first six months of 1929, when 3,381 airplanes were produced, having a value of $23,685,472.

Engines produced by nineteen manufacturers in the first six months totaled 2,052, as compared with 3,826 during the same period in 1929. There were 1,152 engines produced during the second quarter of this year, as compared with 900 in the first three months. Engines produced by these manufacturers in the first six months were valued at $8,445,777.79, as compared with $14,349,375.45 in 1929. Production of aircraft engines for military purposes during the first six months of this year exceeded such production during the same period last year. During the first half of 1930, 819 military engines valued at $4,544,623.79 were manufactured, as compared with 551 units valued at $3,426,001.15 during the same period in 1929.

The total value of airplanes, engines and spare parts produced in the United States during April, May and June was $14,470,425.99, as compared with $11,297,197.48 in the first quarter. The total value of aeronautical products manufactured in the first six months of 1930 was $25,767,623.47, approximately one-half the total valuation of products manufactured in the same period of 1929. Spare parts for both airplanes and engines manufactured in the first six months of this year had a total value of $6,275,787.40.

Production in the second quarter was concentrated on the open-cockpit biplane and the cabin single-engined monoplane. Deliveries of commercial airplanes sold during the second quarter exceeded production by 21.78 per cent., indicating, according to the Aeronautical Chamber, that inventories are fast being depleted.

The average price of the commercial open-cockpit biplane was $3,686, without engine. Excluding special custom built ships, the average price was about $2,650 for standard models in this class. Excluding all high price custom built planes, the open-cockpit monoplanes averaged about $2,000 to $2,300 each. Cabin monoplanes averaged in price from $5,000 to $5,500 each.

REPORT OF ESTIMATED AIRPLANE PRODUCTION FIRST HALF 1930
Based on Department of Commerce Licenses, Identifications, Reports

Monoplanes	
Open-Cockpit (landplane)	
One-place	190
Two-place	64
Three-place	17
Total open	271
Cabin (landplane)	
One-place	1
Two-place	54
Three-place	17
Four-place	144
Five-place	2
Six-place	30
Seven to ten-place	20(a)
Over ten-place	7(b)
Total cabin	275
Miscellaneous	
Flying boats	5(c)
Convertibles	4
Amphibions	7(d)
Total monoplanes	562
Biplanes	
Open-Cockpit (landplane)	
One-place	11
Two-place	180
Three-place	299
Five-place	3
Total open	493
Cabin (landplane)	
Three-place	1
Four-place	1
Six-place	4
Seven-place	2
Total cabin	8
Miscellaneous	
Flying boats	18
Convertibles	49
Amphibions	30(e)
Total biplanes	598
Planes manufactured for experimental purposes for which complete information is not available	17(f)
Military airplane deliveries	359
Airplanes exported	148(g)
Grand Total	1,684

Note: (a) 2 multi-engine planes; (b) 6 multi-engine planes; (c) 5 multi-engine planes; (d) 2 multi-engine planes; (e) 8 multi-engine planes; (f) 1 multi-engine plane; (g) does not include planes manufactured during 1929 and exported during first half of 1930.

REPORT OF ESTIMATED AIRCRAFT ENGINE PRODUCTION FIRST HALF 1930
Based on reports of 19 Manufacturers to Aeronautical Chamber of Commerce

	1st half 1929	*1st half* 1930
Commercial	3,275	1,233
Military	551	819
Total	3,826	2,052
Value		
Commercial	$10,923,374.30	$3,901,154.00
Military	3,426,001.15	4,544,623.79
Total	$14,349,375.45	$8,445,777.79

Number of Aircraft, Pilots and Mechanics Shown in Federal Survey

THE results of a survey of the number of aircraft, pilots and mechanics in the United States made by the Aeronautics Branch of the Department of Commerce as of June 30 was recently made public. The survey shows that there were 9,773 licensed and identified aircraft, 13,041 licensed pilots of all classes, and 8,843 mechanics. The survey shows that of the total number of pilots over 43 per cent were holders of private licenses; over 41 per cent were transport pilots; 14.42 per cent limited commercial, and 1.02 per cent industrial.

California had the largest number of licensed and identified aircraft and was first in the number of licensed pilots and mechanics. This State had 1,275 licensed and unlicensed aircraft; 2,515 pilots, and 1,658 mechanics. Second place was held by New York, which had 1,148 aircraft, 682 pilots and 874 mechanics.

Women Pilots Increasing

THERE were 275 women holding airplane pilots' licenses granted by the United States Department of Commerce in August of this year, according to a recent announcement of officials of the department. In January, 1929, there were thirty-four women holding pilots' licenses in this country; in July, 1929, seventy; and in January, 1930, there were 126 women pilots.

Increase in Physical Examinations for Pilots' Licenses

MORE physical examinations for Department of Commerce pilot licenses were conducted by authorized medical examiners of the Aeronautics Branch, Department of Commerce, during the fiscal year 1930, than in all other years combined since the organization of the Branch in 1926, according to a recent announcement of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. A total of 43,902 physical examinations were given. The total of all years is 81,349.

There was a fifty-four per cent increase over the fiscal year 1929 in the number of physical examinations conducted in the fiscal year 1930. In 1929, 28,478 physical examinations of all classes were conducted as compared with 43,902 for the fiscal year ended June 30, 1930.

Pilots and Other Employes of S. A. T. Insured by Company

THE 304 employes, including pilots, of Southern Air Transport, Inc., a division of American Airways, Inc., have been insured for $2,000 each through an arrangement with West Coast Life Insurance Company of San Francisco. The policy issued the employes covers death or total and permanent disability.

This insurance was written after an investigation of the operations of Southern Air Transport, Inc., in which it was found that planes of the company have flown 4,000,000 miles on schedule without a fatal accident or serious injury to pilot or passenger, and that pilots average seven years' flying experience with an average of 3,350 hours each in the air.

The premium of this policy is paid partially by the employe and partially by the company. Cost to employes is one dollar a month, or twelve dollars a year. New employes are insured after six months' continuous service.

INDIVIDUALS making parachute jumps for purposes of exhibition, testing, training or demonstration are required to wear an auxiliary parachute, under an amendment to the Air Commerce Regulations announced recently by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

The auxiliary parachute must be so arranged that it can be operated in the event the first parachute either fails to function or becomes fouled on any part of the plane or body of the jumper.

Complete European Demonstration of Curtiss-Wright Planes

A TOUR of European countries to demonstrate military and commercial planes has been completed by Maj. James H. Doolittle and other representatives of the Curtiss-Wright Export Corporation, sponsors.

The party, consisting of Major Doolittle, Capt. John K. Cannon, Lieut. James E. Parker and Maj. Melvin A. Hall, left early in April. Included in the group of airplanes were the Curtiss Hawk and Curtiss

Cabot Aerial Pickup Device in operation

Falcon, both powered with a Curtiss-Conqueror engine; the Curtiss Fledgling, a training plane powered with a Wright Whirlwind engine; and the Curtiss Robin, a commercial plane, powered with a Curtiss Challenger engine. The tour was arranged at the invitation of the countries visited, the party giving flight demonstrations in Greece, Turkey, the Balkan States, Rumania, Switzerland and Holland, according to C. W. Webster and John S. Allard, president and general manager, respectively, of the Curtiss-Wright Export Corporation.

Official Results of National Elimination Balloon Race

THE OFFICIAL results of the National Elimination Balloon Race which started at Houston, Texas, July 4, were recently announced by Dr. George W. Lewis, Chairman of the Contest Committee of the N. A. A. The pilots of the balloons placing first and second will compete in the Gordon Bennett International Balloon Race, starting at Cleveland, Ohio, September 1. Ward T. Van Orman, winner of the International race last year, will also represent the United States in the 1930 race.

The official standing of the contestants in the Elimination race was given as follows:

1. Goodyear-Zeppelin Corporation—R. J. Blair, F. A. Trotter, 768 miles.
2. Detroit Balloon Club—E. J. Hill, A. G. Schlosser, 688 miles.
3. United Van Service, Inc.—George Hineman, Milford Vanik, 685 miles.
4. U. S. Navy—T. G. W. Settle, R. G. Mayer, 633 miles.
5. U. S. Navy—Wilfred Bushnell, J. L. Greenwald, 538 miles.
6. U. S. Army—Walter D. Buie, J. P. Kidwell, 385 miles.
7. U. S. Army—K. S. Axtater, R. E. Holmes, 343 miles.
8. U. S. Navy—R. R. Dennett, C. F. Miller, 333 miles.
9. AERO DIGEST—S. T. Moore, W. O. Eareckson, 330 miles.
10. Detroit Balloon Club—S. A. U. Rassmussen, T. W. Southworth, 325 miles.
11. Dr. George M. LeGallee—Dr. George M. LeGallee, R. W. Ebert, 300 miles.
12. Detroit Balloon Club—W. Klickoff, R. Cunningham, 275 miles.
13. U. S. Army—W. R. Turnbull, C. M. Brown, 252 miles.
14. Cleveland Chamber of Commerce—Charles H. Roth, William Carey, 250 miles.

AERIAL PICKUP DEVICE IS TESTED

ALL records for aerial pickups were broken by Roger Wolfe Kahn at Mitchel Field August 8, when he made 101 perfect pickups out of a total of 102 from the Cabot Aerial Pickup Device while piloting a plane in the air. No other pickup machine has been able to achieve better than seventy-five per cent.

The test was the official demonstration for the Post Office Department, whose representative, Inspector Francis E. Smith watched and checked every flight. In addition to Inspector Smith, the Army Air Service was represented by Lieut.-Col. Gerald Brant and the Navy by Commander J. Ross.

The mail sacks caught varied from five to forty pounds in weight and in no instance did the pilot know the weight until after the successful pickup. The airplane flew at varying speeds, never less than eighty-five miles per hour, and often as fast as 110-115 miles per hour. The average time between pickups was two minutes and 3.6 seconds, the plane flying close to two miles between tries. In every flight the pickup pole of the plane struck the shock cord within less than a foot of the center.

The Cabot Aerial Pickup Device was developed by A. W. Card and the late H. G. Bushmeyer after the original patents obtained by Godfrey L. Cabot of Boston.

UNIFORM COLORS FOR AERIAL LIGHTS

DEPARTMENT of Commerce Regulations governing the establishment and certification of aeronautical lights have been revised to require the color characteristics of all aeronautical lights to conform to a uniform standard, according to a recent announcement of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

Effective August 1, aeronautical lights marking points from which the airman may take his bearings at night and leading to an airport or landing field, are to be equal in effectiveness to the standard Department of Commerce twenty-four-inch revolving beacon, equipped with either a clear or aviation red cover glass; and have a color characteristic consisting of either clear or aviation red flashes, or a combination of the two. This type of aeronautical light is to be supplemented by a directional projector pointing a high-intensity pencil of clear light in the direction of the nearest airport or landing field. Unless such aeronautical light is aviation red in color, or has a red flash in its characteristic, it is to be equipped with an auxiliary beacon of aviation red, flashing an International Morse Code characteristic.

Also effective August 1, airway beacons at

(*Continued on next page*)

(Continued from preceding page)
landing field are required to conform to the color standards for lights used on the national airway system, aviation green and red auxiliary lights indicating the presence of landing facilities and the absence of landing facilities, respectively.

Effective January 1, 1931, beacons at airports shall flash a light either clear or aviation green in color, or a combination of the two. Unless the main beacon is aviation green in color, or unless its characteristic includes one or more aviation green flashes having a maximum candlepower of at least 10,000, an auxiliary beacon, aviation green in color, and flashing a definite International Morse Code characteristic shall be provided.

WOMEN'S NATIONAL GLIDING ASSOCIATION

THE Women's National Gliding Association was founded at Wichita, Kan., by a group of women glider enthusiasts who were granted a charter on April 16, 1930, by the Kansas State Charter Board. They had previously organized a glider club comprised entirely of women members. This club, known as the Glidettes, became the Wichita chapter of the national organization.

Activities of the Wichita chapter are held at the Cessna Airport in the evenings and early mornings. The club has obtained a Cessna primary training glider which members use for instruction and other flights. Launching is accomplished by means of towing behind an automobile to which the glider is attached by a shock cord and from which it is cut loose by an automatic release.

Affiliated chapters of the Women's National Glider Association will be organized in cities throughout the country. It is understood that two of these affiliated chapters are being formed at Kansas City, Kan., and Denver, Colo.

A recent survey of members of the W. N. G. A. disclosed that seven joined the organization preparatory to a course in piloting motored planes, and that four of these plan to enter aviation as a business. The remaining members joined for educational purposes and for the sport of gliding. Five members have never ridden in a powered plane; two had glided before the club was formed; none are pilots of motored aircraft; and all but five believe that they would not have become interested in aviation had the club not been formed. Six are married.

The members of the W. N. G. A. are as follows: Allene Arnold, Lillian Bailey, Katherine Brownell, LaVera Branscum, Margaret Casalou, Wanda Cessna, Florence Conroy, Margaret Crumplar, Elizabeth Esswein, Viola Grattan, Hazel Jefferies, Elma Johnson, Gladys Kemper, Grace Kavanaugh, Fara McAlister, Florence Martin, Billye and Marie Mersch, Gladys Olney, Lorraine Ramsay, Vera and Marjorie Schubert, Cora Umbarger and Betty Wilcox.

ORGANIZATION OF GLIDING IN EUROPE

AS the result of the encouragement and aid given to motorless aviation by European governments and aeronautical societies, there has been an increased interest and participation in gliding, particularly in France, Germany, England and Italy. The regulation and development of gliding vary according to the individual programs adopted. In general, however, associations devoted to gliding have been formed, and information and advice on the organization of glider clubs, selection of glider flying terrain, financing glider activities, and the construction and operation of gliders are made generally available.

Uniform rules for the granting of glider pilots' licenses in countries belonging to the Federation Aeronautique Internationale were proposed at a recent meeting of the F.A.I., this proposal being discussed and receiving favorable comment. Under the proposed plan, two types of licenses would be granted: a first class glider pilot's license requiring a flight of at least five minutes above the starting point; and a second class license requiring two flights of at least forty-five seconds with satisfactory landings, and five flights of one minute each, making an S turn and a satisfactory landing on each flight. This plan of granting glider pilot's licenses is based on the regulations effective in Germany.

The largest glider association in Germany is the Rhoen-Rossitten Gesellschaft with headquarters at Frankfort-am-Main and schools for gliding instruction established throughout the country. Over 2,000 glider pilots' licenses have been issued by this society, approximately half of that number having been granted since 1928. There are over 200 glider clubs in Germany and between 300 and 400 gliders which range in price fro $300 to $2,000 each.

The first international congress of glider pilots was held at Darmstadt, Germany, May 12-13. At this Congress a permanent international research committee on soaring flight was organized. Delegates from France, Great Britain, Holland, Belgium, Hungary, Italy, Germany and the United States signed the protocol calling for the establishment of the committee. The International Gliding Meet was held August 9-24 in East Prussia under the auspices of the Rhoen-Rossitten Gesellschaft.

A program of development of motorless aviation in France has been organized by the Comite Français de Propagande Aeronautique in conjunction with l'Association Française Aerienne. The execution of the program is under the supervision of L'Avia, a French aeronautical society. The Comite and l'Association Française have recommended that a gliding institute be formed by the Ministry of Air and the Comite Française for the purpose of advising and aiding glider organizations. L'Avia helps clubs to choose proper sites for gliding and will furnish plans and other information on glider construction, in addition to conducting research on the design of gliders and sailplanes. L'Avia coöperates with the National Meteorological Office which supervises the dissemination of information on aerodynamics for the benefit of glider enthusiasts. The Meteorological Office maintains a staff to instruct glider pilots and a staff which collects data on terrain for gliding. L'Avia has recommended that students begin flying instruction in the monoplane type of glider and that no attempts be made to start from buildings or abrupt inclines until the student has completed preliminary instruction. Arrangements were recently completed by L'Avia for an exchange of technical information and results of experiments with the Rhoen-Rossitten Gesellschaft of Germany.

In addition to these organizations, gliding is sponsored in France by the Club Aeronautics Universitaire which teaches members to fly gliders and supervises the organization of groups interested in gliding among the faculties of the French universities and schools.

There are no glider clubs in Italy. The Air Ministry operates three schools located at Pavullo, Tuscany; Luigi Gavatti Airport, Genoa; and the Monte Mario Field near Rome. Boys seventeen years of age or over who are members of the Avanguardisti, the Fascist Boy Scouts, are eligible for instruction at these schools which are in session for three months during the summer.

The British Gliding Association was formed recently. The association will assist in the formation of gliding clubs throughout England and will distribute drawings to clubs desiring to build their own gliders. The London Gliding Club has affiliated with the British Gliding Association.

It was recently reported that Herr Kronfield, German glider champion, will give a series of glider demonstrations in England and that a school of glider instruction is to be established with both men and women as students. According to Howard Flanders, honorary secretary of the British Gliding Association, the cost of tuition in the school will be equivalent of approximately $25, $30 and $40 respectively for the A, B, and C certificates respectively of the F.A.I. Each certificates requires a period of instruction of two weeks. The A certificate requires a flight of thirty seconds in a straight line; the B for a flight of one minute making an S turn; and the C for a flight of five minutes at an altitude higher than the starting point and returning to the starting point when landing. These certificates will be issued by the Royal Aero Club.

FORTY-THREE glider pilot licenses have been issued by the Aeronautics Branch of the Department of Commerce since the receipt of the first application for such licenses the first of this year. This number includes pilots of the Aeronautics Branch who have been licensed, in addition to other individuals. All of the licenses which have been issued are of the commercial type. There are three types of glider pilot licenses issued by the Aeronautics Branch—student, non-commercial and commercial.

DEMONSTRATING PLANE SAFETY

By MAJOR WILLIAM B. ROBERTSON

President, Curtiss-Robertson Airplane Manufacturing Co.

WHEN a twin-engined airplane continues to climb under full load after one of its engines has cut out on the take-off, something very tangible has been achieved in making the airplane safe.

This is what the Curtiss Kingbird proved it could do on a recent 16,000-mile demonstration tour of the country. The tour was especially timely in view of the widespread discussion of the value of multi-engined planes from the standpoint of safety in the event of engine failure either at the take-off or in the air.

In flying the ship from St. Louis to Canada, through the East and South, the West Coast and back again to St. Louis, we undertook to demonstrate to a wide public the safety factor inherent in a twin-engined plane which will climb and maneuver on only one of its engines. The Kingbird is an eight-place cabin monoplane, powered with two Wright Whirlwind 240-horsepower or 300-horsepower engines. It is especially designed for service transport lines and for the use of business executives.

Throughout our tour we found that the performance of the ship on one of its two engines created unusual interest. On one occasion, for instance, the day before the plane arrived at Milwaukee, Wisconsin, for a demonstration to officials of the A. O. Smith Corporation, manufacturers of automobile chassis and pipe, there had been demonstrations of a number of single-engined planes. The performance of these planes had been excellent, and when we landed at the flying field we found that pilots and mechanics were frankly skeptical of the claim that a twin-engined ship could perform satisfactorily on one engine.

We invited the officials and engineers of the Smith corporation to fill up the plane for a test flight. The field was quite muddy. The officials took their seats in the cabin. Our pilot was at the controls. The test pilot for the company sat beside him.

"You are going to be the fellow who cuts one of the engines," our pilot told the man beside him.

"When shall I cut it?" came the question.

"Any time after our wheels leave the ground."

The plane started across the muddy field, turned into the wind, and shot ahead with both engines open. As the wheels left the field, the test pilot leaned down and cut the switch on the right engine. There was no way of telling which engine would be cut. The plane climbed steadily with one engine dead, the left motor pulling the load which consisted of the plane, eight people and full fuel tanks. The ship climbed to a good altitude, and it was then demonstrated that the plane can turn with or against the single engine in operation.

From what I observed on the tour, twin-engined planes will have an increasing appeal, especially to two classes of owners: the operator and the business executive. The transport operator cannot afford to have a single engine failure resulting in a crash or a forced landing. Yet, if the engine fails, this is possible with a single-engined ship, or with a multi-engined ship which will not perform properly after one of its engines cuts out.

The executive needs a fairly large plane, whether it is for his own personal use or for his company. He is best served by a plane in which he is sure of getting to his destination and to his business engagement even if there should be an engine failure. Incidentally, twice on our tour one of the engines was cut out while flying from city to city; the plane continued on to the destination with only one engine functioning.

Although our primary purpose on the whole tour was to demonstrate the safety of the twin-engined plane under conditions that might arise in everyday use, it is to be noted that the ship was successfully flown on one engine while in the air. This is of greater theoretical than practical importance, of course, since it is just after the take-off that an engine failure usually proves critical.

Blimp Lands on Steamship

THE Goodyear blimp *Mayflower* landed on the deck of the North German Lloyd liner *Bremen* recently while the ship lay in quarantine in New York harbor and took off Paul W. Litchfield, president of the Goodyear-Zeppelin Company as passenger. Although a brisk breeze was blowing at the time, Karl Fickes, pilot of the blimp, brought the aircraft down safely on the deck of the steamship. Mattresses were placed on the deck of the ship to reduce the contact of the blimp's cabin.

Barber & Baldwin Merit Trophy at National Air Races

BARBER & BALDWIN, Inc., aviation insurance underwriters, have donated a cup, known as the Merit Trophy, to be competed for at the National Air Races, Chicago, August 23-September 1. The trophy will be given to the pilot who, in the opinion of the committee of judges, accomplishes the most meritorious flying performance at the National Air Races. The purpose of the trophy is to encourage highly accomplished flying within reasonable limits of risk, according to the company.

COMPLETE LIST OF APPROVED TYPE CERTIFICATES FOR AIRCRAFT ENGINES

Aircraft engines listed below had received Approved Type Certificates from the Department of Commerce as of July 20, 1930.

Key: 4—number of cylinders; R—radial (arrangement); V—vee (arrangement); L—in line (arrangement); I—inverted; A—air cooled; W—water cooled; G—gear drive.

ATC NO.			*Rated h.p.*	*At r.p.m.*
1	Fairchild Caminez 447-C	4RA	120	960
2	Warner Scarab	7RA	110	1,850
3	Kinner K-5	5RA	100	1,810
4	Lambert Velie M-5 (R-250)	5RA	65	1,900
5	Curtiss Challenger R-600	6RA	185	2,000
6	Curtiss Conqueror V-1550	12VW	600	2,400
7	Curtiss Conqueror GV-1570	12VW-geared	600	2,400
8	Curtiss Chieftain H-1640	12RA	600	2,200
9	Aircraft Comet	7RA	130	1,825
10	Curtiss D-12	12VW	435	2,300
11	Dayton Bear	4LA	100	1,500
12	LeBlond 60	5RA	65	1,950
13	Wright J5 Wbirlwind	9RA	220	2,000
14	Pratt & Whitney Wasp	9RA	420	2,100
15	Pratt & Whitney Hornet	9RA	525	1,900
16	Axelson Axelson	7RA	115	1,800
17	Wright Cyclone R-1750-A	9RA	525	1,900
18	Packard 3A-1500 Direct	12VW	525	2,100
19	Packard 3A-2500 Direct	12VW	800	2,000
20	LeBlond 90	7RA	90	1,975
21	Wright J-6 R-975	9RA	300	2,000
22	Arnold Harris	8VW	90	1,400
23	Wright J-6 R-540	5RA	165	2,000
24	Alliance Hess Warrior	7RA	115	1,925
25	Michigan Rover	4LAI	55	1,900
26	Wright J-6 R-760	7RA	240	2,000
27	Lycoming R-645	9RA	185	2,000
28	Pratt & Whitney Hornet R-1860 Series B	9RA	575	1,950
29	Pratt & Whitney Hornet R-1690-A Geared 2:1	9RA	500	1,900
30	American Cirrus Mark III	4LA	90	2,100
31	Aircraft Engines LA-1 A. C. E.	7RA	140	1,800
32	Continental A-70	7RA	165	2,000
33	Light Mfg. & Fdy. Co. Brownback Tiger C-400	6RA	90	1,700
34	Kimball Beet'e K	7RA	120	1,850
35	Chevrolet "Chevrolair" D-4	4LAI	90	2,000
36	General Airmotors Moore	5RA	120	1,600
37	Michigan Aero Rover	4LAI	75	1,975
38	Lambert R-266	5RA	90	2,375
39	Pratt & Whitney Wasp Junior	9RA	300	2,000
40	Wright Gipsy L-320	4LAI	90	1,950
41	Aeromarine RAD-B	9RA	115	1,925
42	Lycoming R-680	9RA	215	2,000
43	Packard Diesel DR-980	9RA	225	1,950
44	American Cirrus Mark III Supercharged	4LA	110	2,100
45	Western L-7	7RA	130	1,850
46	LeBlond 85 (R-265)	5RA	85	2,125
47	Comet Model 7-E	7RA	165	1,900
48	LeBlond 70 (Model 5D-E)	5RA	70	1,950
49	MacClatchie Panther Model X-2	7RA	150	1,900
50	Menasco "Pirate A-4"	4LAI	90	1,925
51	Kinner (R-440)	5RA	125	1,925
52	LeBlond 110	7RA	110	2,150
53	Szekely SR-3	3RA	30	1,750
54	Warner Scarab Jr.	5RA	90	2,025
55	Pratt & Whitney Wasp Model R-1340-C (Geared)	9RA	425	2,050
56	Chevrolair D-6	6LAI	165	2,175
57	Fairchild 6-390	6LI	120	2,150
58	P. & W. Wasp S. C. (10:1 Impeller gears)	9RA	450	2,100

THE First National Legislative Air Conference was held in Chicago, Ill., August 18-20 at the Northwestern University School of Law. The conference was sponsored by the State of Illinois, the Illinois Aerial Navigation Commission, the Illinois Commerce Commission, the Chicago Association of Commerce and the Air Law Institute.

S. A. E. AERONAUTIC MEETING
August 26, 27 and 28, 1930
(During the National Air Races)

Headquarters, Palmer House, Chicago, Ill. Morning and evening sessions.

Tuesday, August 26

10:00 a. m.—"Engines," J. H. Geisse, chairman; vice president Comet Engine Corp.
"Manufacturing Costs of Aircraft Engines," E. D. Herrick, chief engineer Lycoming Mfg. Co.
"Comparative Data on Power Plants for Motor Cars and Aircraft," H. M. Crane, assistant to president, General Motors Corp.

8:00 p. m.—"Airplane Design," B. Russell Shaw, chairman; president B. Russell Shaw Co., Inc.
"Flight Research," J. W. Crowley, Jr., National Advisory Committee for Aeronautics.
"The Possibilities of Radical Airplane Design," Wm. B. Stout, president Stout Air Services, Inc.

Wednesday, August 27

10:00 a. m.—"Airplane Design," Mac Short, chairman; Stearman Aircraft Co.
"Weight Saving by Structural Efficiency," Chas. Ward Hall, president Hall Aluminum Aircraft Corp.
"Weight Saving by Structural Efficiency," A. A. Gassner, chief engineer General Aviation Corp.

8:00 p. m.—"Spinning Characteristics and Control," Dr. George W. Lewis, chairman; director Aeronautical Research, National Advisory Committee for Aeronautics.
Symposium:
Paul E. Hovgard, Keystone Aircraft Corp.
Garland P. Peed, Jr., aeronautical engineer.
Temple Joyce, Berliner-Joyce Aircraft Corp.
H. A. Sutton, Aviation Corp.
Fred. E. Weick, National Advisory Committee for Aeronautics.
Carl Harper.

Thursday, August 28

10:00 a. m.—"Aircraft Fuels," Wesley L. Smith, chairman; superintendent Eastern Division, National Air Transport, Inc.
Symposium:
E. E. Aldrin, Standard Oil Co. of New Jersey.
C. S. Fliedner, Bureau of Aeronautics, Navy Department.
S. D. Heron, Material Division, Air Corps.
C. M. Larson, Sinclair Refining Co.
W. A. Parkins, Pratt & Whitney Aircraft Co.

6:30 p. m.—"Aircraft Banquet," Wm. B. Stout, toastmaster.

COMING AERONAUTICAL EVENTS

August 23-September 1. National Air Races, Chicago, Ill.
August 26-28. S. A. E. Aeronautic Meeting, Chicago, Ill.
August 28-September 1. Dedication of Airport, Yuba City, Calif.
August 30-September 1. James Gordon Bennett Balloon Race and Aerial Carnival, Cleveland, Ohio.
September 1. First Annual Thompson Trophy Race, Chicago, Ill.
September 1. Dedication of airport, Wauchula, Fla.
September 1-4. Sioux Falls Airfair, Soo Skyways Airport, Sioux Falls, S. D.
September 1-6. Fifth International Air Congress, The Hague, Holland.
September 6-7. Second Annual Canadian Air Pageant, sponsored by Montreal Light Aeroplane Club, St. Hubert Air Harbour, Montreal, Canada.
September 6-7. Air Meet, Lincoln Airport, Philadelphia, Pa., auspices American Legion.
September 6-8. International Aero Exhibition, Stockholm, Sweden.
September 11-27. National Air Tour, starting and ending at Detroit, Mich.
September 13-14. Dedication of Williamson-Johnson Airport, Duluth, Minn.
September 15. Dedication of Robert Mueller Airport, Austin, Texas.
October 17-20. Dedication of Municipal Airport, Denver, Colo.
November 6-7. Regional Conference on Traffic Problems and Aviation Progress, for Southwestern States, auspices U. S. Chamber of Commerce, Dallas, Texas.
November 28-December 14. International Aero Show, Grand Palais, Paris, France, auspices of Chambre Syndicale des Industries Aéronautiques.
December 5-6. Open Meeting of Western States Aeronautical Association, Portland, Ore.
December 10-23. International Congress of Aerial Security, Paris, France.
February 1-20, 1931. First Pan American Aeronautical Conference, Montevideo, Uruguay.
May 15-31, 1931. International Aero Exhibition, Stockholm, Sweden.

"Flying Classroom" for N.A.T. Pilots

A NEW system by which its pilots will be schooled in the latest developments in instrument flying is being undertaken by National Air Transport, carrier of air mail and air express between New York, Chicago, Kansas City and Dallas.

A "flying classroom" has been built into an N.A.T. dual controlled Douglas biplane. The rear cockpit of the plane is enclosed with glass, painted black so that light can not enter, and a communication system is installed in the forward cockpit which enables the instructor to talk to the pilot he is tutoring.

Seated in the darkened rear cockpit, the pilot must rely solely upon the navigating and flying instruments mounted before him to keep the plane on its course and in a proper flying position, while the instructor, by means of the plane's interphone system, explains the procedure to be followed.

The specially equipped plane will soon make a trip over the N.A.T. system in order that the entire pilot personnel can can be instructed in the latest technique in instrument flying.

The "flying classroom" is being put into service to make available to all N.A.T. pilots additional knowledge in instrument flying so that air mail and express can be advanced under weather conditions that might otherwise cause delays.

Survey of Salaries Paid to Pilots and Mechanics

AIR mail and passenger pilots received an average monthly salary of $550 during the last six months of 1929 and the first six months of this year, according to a survey of the pay schedules of a representative group of operators of both passenger and mail routes conducted by the Aeronautics Branch of the Department of Commerce and made public recently by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Airplane and engine mechanics received an average monthly salary of $157 during the same period, the survey showed.

The pilots received an average monthly base pay of $189. This sum was increased to an average total monthly salary of $550 by the addition of certain sums paid by operators for each mile flown, which varied with conditions under which the flying was conducted and depended upon day or night schedules. The additional amounts averaged five cents a mile for day flying and ten cents for night flying.

The highest monthly salary was $850. This was paid by one line to its air mail pilots flying at night.

THE total value of products made in 1929 by establishments in the United States engaged primarily in the manufacture of aircraft and parts amounted to $61,973,079, an increase of 192.9 per cent as compared with a total of $21,161,853 reported for 1927, the last preceding census year. This information was recently announced by the Bureau of the Census and was obtained from data collected in the Census of Manufactures taken in 1930. The total for 1929 is as follows: Airplanes, 5,130, valued at $38,724,987; seaplanes and amphibions, 176, valued at $5,949,671; parachutes, 6,188, valued at $1,437,602; propellers, 14,184, valued at $2,040,299; other complete aircraft, $639,990; airplane parts, and engines made for sale as such, $8,187,-285; repair and experimental work, $3,387,-269; and other products, $1,605,976.

SPEED

Travel Air Mystery Ship—America's fastest commercial plane. Used by Captain Hawks for both East-West and West-East Trans-continental records.

RELIABILITY

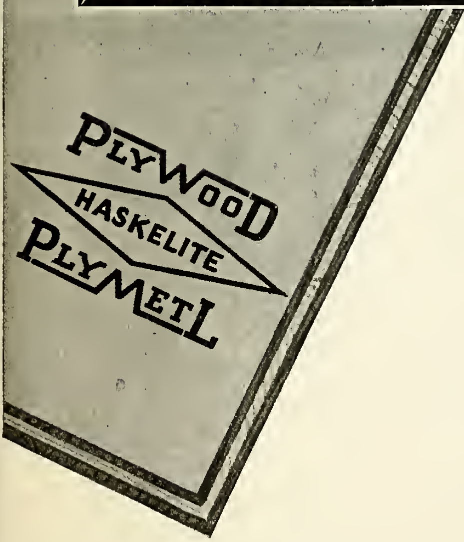
Waco plane, piloted by Bert Livingston, winner of the last Ford Reliability Tour.

ENDURANCE

Refueling endurance record, established by Jackson and O'Brine, in the Curtiss Robin monoplane, "Greater St. Louis." Former record held by the Hunter Brothers in a Stinson.

SAFETY

The Curtiss "Tanager," winner of the International Safe Aircraft Competition, organized by the Daniel Guggenheim Fund for the Promotion of Aeronautics, was an extensive user of Haskelite.



HASKELITE RECORDS

The above record breaking and record holding planes were all equipped with Haskelite, the blood-albumin glued aviation plywood. Practically all the outstanding flights have been made with planes using Haskelite; including the Lindbergh Atlantic flight, Chamberlin Atlantic flight, Dole Pacific flight, Byrd Atlantic flight, "Southern Cross" East to West Atlantic flight.

Haskelite's outstanding quality is further attested by the fact that it has been used by more than 85% of the manufacturers whose planes were entered in the air shows and races in recent years. Haskelite was represented in at least that proportion at the National Air Races, at Chicago.

Write for engineering data on Haskelite and Plymetl (metal-faced plywood) and their aircraft applications.

Curtiss Flying Service

California Panel & Veneer Co.
Los Angeles, Calif.

Air Associates, Inc.
Garden City, L. I.

In Canada: Railway & Power Engineering Corporation, Ltd.

TRAVEL BY AIR — USE AIRMAIL — AERONAUTICAL CHAMBER OF COMMERCE — HASKELITE

HASKELITE
MANUFACTURING CORPORATION

120 SOUTH LASALLE STREET CHICAGO, ILLINOIS

AD9-Gray

NEW YORK

DAILY plane service between New York City and Saratoga started July 30 and will continue during the annual racing season until Labor Day, according to Major E. H. Brainard, vice president and operations manager of the Curtiss-Wright Flying Service, operators of the line. Eight-place amphibions will be used and will take off from the North Beach Airport at noon each day on the hour-and-forty-minute flight North; and leave Kaderoseres Beach on the lake front at Saratoga after the last race daily for the return trip, approximately at 5:30 p.m. A fare of $30 is charged. Special motor boats are available between North Beach and the landing stage on the East River at 31st Street.

AIR Associates, Incorporated, aircraft equipment and service company, operating at Roosevelt Field, New York, and the Chicago Municipal Airport, has been appointed distributor and service representative in both territories by the Warner Aircraft Corporation of Detroit.

Air Associates is the authorized parts and service representative for Wright and Pratt & Whitney engines, Scintilla magnetos, Eclipse starters, Stromberg carburetors, Hamilton Standard propellers and Russell parachutes.

THE formal announcement of Stanavo Aviation Gasoline was made by the Stanavo Specification Board, Inc., of New York, at the National Air Races.. This latest Stanovo product is rapidly being made available at airports throughout the country and shortly will have the same distribution as Stanavo Aviation Engine Oil, which was introduced at the Cleveland races last year. The new gasoline, like other Stanavo products, is made under the supervision of the Stanavo Board, the members of which are the Standard Oil Company of California, Standard Oil Company (Indiana) and Standard Oil Company of New Jersey.

CHANGES in the personnel of Valentine and Company of New York City, effective as of August 1, were recently announced by O. A. Hasse, executive vice president of the company.

E. W. Michael has been appointed director of trades sales, to succeed Mr. Drescher; Frank P. Connolly, director of sales promotion; M. F. Emrich, director of industrial sales; Leonard Mould, in charge of Canadian interests; R. D. Sullivan, manager of the Chicago branch, to succeed Mr. Kleckner, and L. J. Lamb, to succeed Mr. Connolly, in charge of automotive trade, formerly under Mr. Connolly's direction with headquarters in Detroit.

FOR the seventh year the Brooklyn Polytechnic Institute of Brooklyn, N. Y., offers to the general public an evening course in the study of the Diesel Engine. The course will start September 30, and due to the rapid developments in the use of this engine, the course has been revised to keep it completely up-to-date with modern practice.

The Institute will give a course of twenty lectures, one each week. The lecturer will be Julius Kuttner.

In addition to the lectures, a supplementary course consisting of classroom discussions and laboratory experiments will be given on alternate weeks. Professor F. D. Carvin of the Polytechnic Institute will conduct the classroom discussions.

NEW Westinghouse equipment is being installed and tested at the field of the D.W. Flying Service, Inc., Le Roy, N. Y. Already a number of passengers have taken advantage of the lights and are making flights after dark. The U. S. Department of Commerce regulations are fulfilled by these lights, and as soon as the equipment is installed and approved, the field will receive a transport rating. Russ Holderman, president, has announced that all lights are expected to be installed and working by September 1.

ALFRED SCHWARZ, president of the Wing Aeronautical Company, announced recently that the first Dragonfly light airplane will be available within the near future. This plane, scheduled to sell at $650, is equipped with a 35-horsepower engine which drives a three-blade propeller. The ship is designed as a glider to sustain flight in favorable wind currents, but has all the features of a light airplane. The plane was developed by Mr. Schwarz.

Capt. Frederick A. Pippig, German glidist, is chief engineer in charge of construction.

SUMNER SEWALL, formerly general traffic manager of the Colonial Airways System, has been elected president of the American Motorless Aviation Corporation. Major C. H. Biddlecombe was elected vice president and Sherburne Eaton, former vice president of Colonial Airways, was elected treasurer.

[M. MARVIN]

A new aviation company recently organized by a group of business men at Rome, N. Y., will be known as the Rome Airways, Inc. Dick Lemon, formerly instructor at Hayes Airport, Cicero, has appointed chief instructor for the new company. Rome Airways recently accepted delivery on a new American Eagle biplane purchased through Hayes Aviation.

NEW ENGLAND

AIRPLANES flying over privately owned property are entirely within their lawful rights providing they maintain a sufficient altitude to comply with Department of Commerce laws, it was ruled recently at Grafton, Mass., by the Supreme Court of Massachusetts.

This ruling brought to a close a lawsuit to prevent airplanes of a local flying service from passing over privately owned land adjoining the airport because of the owner's objection to the noise of motors overhead, it is said.

NEW JERSEY

EASTERN Air Transport, Inc., operating between Newark, N. J., and Miami, are equipping their entire fleet with Stromberg-Carlson Aircraft Receivers. The work is progressing at Atlanta under the supervision of F. E. Gray, formerly in the radio department of National Air Transport and supervisor of the Cleveland Division.

A PROCESS of manufacturing berryllium which will reduce the cost of the finished product has been developed by Alfred Schwarz, president of the Wing Aeronautical Company of New York, according to a recent announcement of officials of the company.

Berryllium, which up to the present time costs approximately $100 a pound, will be available at $4 the pound, according to the company. Previously, nineteen operations were required to extract pure berryllium from the minerals in which it is found. The new process is said to require one operation for berryllium oxide—the next step to the pure element.

DELAWARE

IN accordance with the regulations of the Department of Commerce, the Bellanca Aircraft Corporation, of Newcastle, Del., is proceeding to appoint as approved repair stations, companies located at strategic points and equipped and experienced in the care and service of airplanes.

Included in the stations appointed are the following: Air Associates, Roosevelt Field, Garden City, L. I.; Air Associates, Municipal Airport, Chicago, Ill.; Pal-Waukee Airport, Inc., Chicago, Ill.; Thompson Aeronautical Corporation, Detroit, Mich.; Thompson Aeronautical Corporation, Cleveland, O., and Timm Aircraft Corporation, Glendale, Calif.

TWO high-compression, supercharged, 550-horsepower Bristol-Jupiter engines have been ordered by the Bellanca Aircraft Corporation for use in experimental flights. It was not announced in what type of Bellanca plane these engines will be installed.

MARYLAND

[E. W. WALSH]

TWO changes in the personnel of the B-J Aircraft Corporation, formerly the Berliner-Joyce Aircraft Corporation of Baltimore, Md., have been announced by officials of the company. William H. Miller, formerly chief of research, has been appointed assistant chief engineer and George Arnold has been named factory manager.

TEMPLE N. JOYCE, vice president and general manager of the B-J Aircraft Corporation, addressed one of a series of meetings of the Society of Automotive Engineers held August 27 in conjunction with the National Air Races at Chicago. He

(Continued on next page)

(Maryland News continued)

spoke on "Flat Spins." The session was devoted to a discussion "Spinning Characteristics and Control."

PENNSYLVANIA

A COURSE in aviation has been inaugurated at the Pennsylvania Military College under the direction of Captain Frank Mills. Cadets will fly every day, weather permitting. The course will include thirty lessons of dual flying instruction and thirty lessons in solo flying. The course is scheduled to start in September with an enrollment of about fifty cadets.

The instruction will be carried on daily at the flying field at Essington, Pa., and motor transportation will be provided to and from the field. The new course will be supervised by Lieut. Jesse L. Gibney of P. M. C.'s military department. Captain Mills will direct the actual flying instruction.

PITTSBURGH

[BOB COATES]

A MINIATURE golf course is being installed in front of the administration building at Bettis Field. The course at the Pittsburgh-Butler Airport has proved a popular drawing card.

A NEW Stinson, Jr., Lycoming-powered, has been placed in service by the Dawson-Babcock Flying School at Rodgers Field. The ship will be used for advanced instruction and taxi service.

A "SOLO" party was held at Rodgers Field by more than fifteen flying students who recently soloed after courses of instruction at the Morris Flying Service base at that field.

WEST VIRGINIA AIRWAYS, operators of the new Charleston airport, announced August 15 as the opening date for a daily service between Pittsburgh and Charleston. A round trip will be made daily, they announced, and the 170 miles will be covered in about an hour and a half.

FARE reductions, in some instances as much as twenty per cent, have been announced by Clifford Ball, president of the Pennsylvania Air Lines. Increasing patronage was given as the reason for permitting the cut. The fare from Pittsburgh to Washington, formerly $25, now is $20. The same change is made to Baltimore; to Youngston, formerly $10, the charge is $7.50; and to Cleveland, formerly $15, is $12.

A NEW Micarta landing skid is being tested on the glider of the Westinghouse Glider Club.

THE Wilkinsburg American Legion has organized a glider club.

THE Hamilton Standard Steel Propeller Corporation held its annual picnic August 9 at Mineral Beach.

AMONG the projects passed upon by the Art Commission here is a directional tablet for the official air beacon on the Grant Building.

THE cent-a-pound rate at the Pittsburgh-Greensburg Airport, operated by the Main Aeronautics Company, has proved a popular innovation in the Sunday programs at that port.

PHILADELPHIA

[R. GARD]

AIR transport passenger service between Philadelphia and Atlantic City was recently inaugurated by the Ludington Philadelphia Flying Service. Planes make four trips daily in each direction. Two Travel Air monoplanes were used to inaugurate the service. A Stinson trimotor was later pressed into use to handle the large number of passengers who made bookings for the flight. In addition to the forty minutes required to cover the distance between the two cities, fifteen minutes are allowed at each end of the journey for bus trips to and from the field. Including the bus fare, the cost to the passenger is $3.90.

According to schedule, planes leave Central Airport, Camden, at 8:25 and 9:25 a. m. and 4:25 and 5:25 p. m. Planes leave Bader Field, Atlantic City, at 9:15 and 10:15 a. m., and 5:15 and 6:15 p. m.

Tickets are sold at bus terminals at either end of the route, at Central Airport, Bader Field, and the Ludington ticket office in the Atlantic Building.

ONE of the newest types of the autogiro built by the Pitcairn Cierva Autogiro Company here, recently made a flight from Hallowell Field to Washington, D. C., piloted by Jim Ray of the Pitcairn company.

THE sale of the Hog Island site to the City of Philadelphia for development as an air-rail-marine terminal was consummated recently when T. V. O'Connor, chairman of the United States Shipping Board, signed the deeds of conveyance of the tract and a receipt for a city warrant in the sum of $450,000, the initial payment of the $3,000,000-purchase price of the property. This action taken enables the city to proceed immediately with its plans for filling in back areas which will be used for the airport, the first phase of the threefold development.

THE Jacobs Aircraft Engine Corporation, Central Airport, Camden, N. J., has developed a twenty-horsepower engine for use in light planes or gliders, according to recent reports.

The engine, developed by Al Jacobs and Henry McFadgen, is of the two-cylinder, air-cooled type, and weighs sixty pounds.

LIEUT.-COMDR. Robert S. Hedtler, U.S.N.R., recently began his duties as chief of the new City Bureau of Aeronautics. The Bureau was formed in order that adequate management might be provided for the new municipal airport.

OHIO

J. C. PROSSER has been appointed manager of the airport division of the Austin Company, engineers and builders, of Cleveland, O. Mr. Prosser has been associated with the company during the past two years and has taken part in numerous operations, including the survey, design and construction of airports.

THE Midland Steel Products Company, of Cleveland, O., has acquired all the rights under the American and foreign patents covering airbrakes for automobiles and airbrakes and starters for airplanes and boosters for all styles of brakes, from Niels Anton Christensen, according to a recent announcement of E. J. Kulas, president of the Midland company.

Production will be at the Cleveland plant of the company and will entail the employment of additional working forces. Mr. Christensen will be associated with the Midland Steel Products Company in an engineering capacity.

COLUMBUS

[W. DONALD WALTER]

HAROLD NEELY, Department of Commerce Inspector, was the first candidate examined by the rating board recently authorized for Norton Field. The flying examination proceedings appeared to be at a standstill, due to the total lack of a training type ship necessary for a portion of the examination, but fortunately a couple of officers from the Materiel Division flew in with a PT3. Lieutenant McConnell promptly appropriated the PT for the short period necessary to satisfy the board that Neely could really handle a training type of airplane. Neely was recommended for an Army Air Corps rating by the board.

FOUR beacons have been installed in the corners of the tower of the American Insurance Union citadel, the tallest building in Columbus. It has been reported by air mail pilots that the beacons are visible as far west as Dayton on clear nights. This building, the city's most prominent aerial landmark by day, thus becomes equally valuable to the night-flying pilot.

LIEUTENANT McCONNELL has literally pulled another PT out of the air for his Reserve pilots. We have been without airplanes before the beginning of this fiscal year, as our ships were all assigned to Selfridge for the summer camps. Lieutenant McConnell ferried it over from Middletown Air Depot the first week in August. He was held up at Cumberland and again at Uniontown by thick weather, but on the last leg, from Uniontown to Columbus, flying conditions were perfect, and the 165-mile hop was made in two hours

(Continued on next page)

(*See Announcement on Page* 190)

(Ohio News continued)

and ten minutes.

BLEACHERS seating about a thousand spectators have been erected at Port Columbus, immediately west of the administration building. It is hoped that they will solve the problem of keeping spectators off the field while ships are landing and taking off.

THE air-mail ships of Continental Airplanes, Inc., are now landing at Port Columbus instead of at the Columbus Airport on the other side of the city, where they have been serviced for the past two years. Continental and city officials have evidently come to terms regarding the leasing arrangements. The Louisville-Columbus-Cleveland air mail service celebrated its second anniversary August 1.

CURTISS-WRIGHT FLYING SERVICE has been using a Curtiss Thrush, Wright-powered, to carry passengers for short hops out of Port Columbus and also for cross-country passenger service. Although this ship has been in service but two months, it has 126 hours to its credit.

MAJOR WILLIAM F. CENTNER, superintendent of Port Columbus, and Frank M. McKee, manager of the local Curtiss-Wright base, were among the members of a committee appointed by the Governor to act as delegates from Ohio to the air conference held in Chicago in August.

THE town of Circleville, twenty miles south of Columbus, recently staged an Aviation Day, sponsored by the Chamber of Commerce. The *Sohioan* of the Standard Oil Company, the Curtiss Thrush from Port Columbus, and one of the Goodyear blimps were flown to Circleville for the occasion. Lieutenant McConnell was the principal speaker at a dinner following the day's celebration.

INDIANA

A PARTS and supply store room located at Dresser Field, Terre Haute, Ind., has been opened by John S. Cox and Son, distributor of aeronautical accessories. The shop will be operated in connection with the general aeronautical supply department of the company located in the business district of Terre Haute.

[R. Hoenig]

A $500,000-airport will be developed by the Bendix Aviation Corporation on a tract of more than 400 acres located at the city limits of South Bend, Ind., according to a recent announcement of Herbert L. Sharlock of the Bendix corporation. Articles of incorporation were reported filed recently at Indianapolis by Bendix Airport, Inc., capitalized at $500,000.

The field will represent further concentration at South Bend of the activities of the Bendix company, the Stromberg Carburetor unit of the Bendix company having been recently brought to South Bend to occupy a new factory with the Bendix Brake unit.

The incorporators of Bendix Airport, Inc., are Vincent Bendix, Walter J. Buettner, Herbert L. Sharlock and Elmer M. Kasdorf.

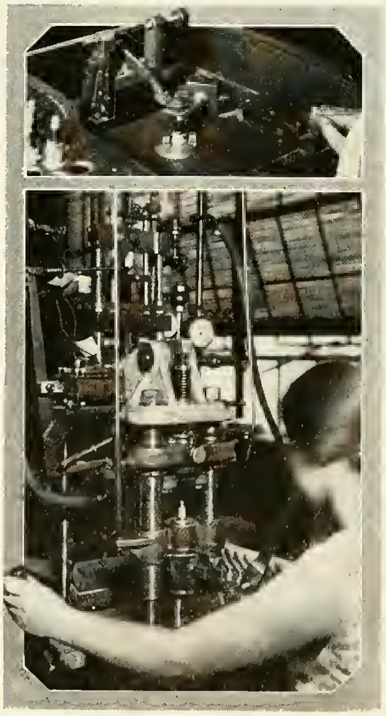
MICHIGAN

THE plant of the Ryan Aircraft Corporation, division of the Detroit Aircraft Corporation, has been moved from St. Louis, Mo., to Detroit, according to a recent announcement of Edward S. Evans, president of the Detroit Aircraft Corporation. The Ryan plant at St. Louis will be used as a central service station for all of the models manufactured by the Detroit company.

The Detroit plant has been enlarged to take care of Ryan production and a $827,000-order for bombers recently placed by the Navy. Ryan production will be centered on the new Foursome for the present.

OF the sixty airplanes licensed by the Department of Commerce for the week ending July 19, thirty, or fifty per cent. of the industry's total, were issued for Stinson Junior planes, according to figures recently compiled by officials of the Stinson Aircraft Corporation of Wayne, Michigan.

D. H. HOLLOWELL has been appointed sales manager of the Verville Aircraft Company, Detroit, Mich. Mr. Hollowell was formerly sales director of the American Eagle Aircraft Corporation, Kansas City, Mo.



Manufacturing AC mica plugs; (above) electric shock test; (below) assembling the spark plug (see also story on page 102)

Results of Michigan Air Tour

[K. F. Zeisler]

CONCLUSION of the Second Michigan Air tour in July terminated the connection of the city of Pontiac with this annual event and opened up the way for Jackson to prepare for the third tour in 1931. The tour this year was far more successful than that of 1929. Forty ships participated. There was a larger turnout at the ports visited, more passenger hopping by pilots, and, most important, perhaps, perfect weather throughout the entire nine days of the tour.

A profit of $1,000 was realized on the tour by the Pontiac Board of Commerce, sponsors, in contrast to the $5,000 deficit incurred last year. Sixteen stops were made. Revenue for the tour came through pilots' entry fees and the fare of passengers. Local committees provided entertainment and fuel for pilots, and collected a share of receipts from passenger hopping. On the return of the caravan to Pontiac, pilots participated in a "Dollar Day" business, taking up passengers for one dollar.

According to G. Donald Kennedy, director of both the 1929 and 1930 tours, the field for this type of aviation promotion lies in the future in the smaller communities. "Big cities," said Kennedy, "are not much interested, but the smaller towns that are just waking up to air possibilities are ideal. They welcome the opportunity to entertain a large fleet of ships, and the tour helps them put over the idea of municipal expenditures for landing fields."

AIRPORT dedications have been featuring midsummer aviation activities in Michigan. Three cities, Niles, Manistee and Newberry, opened new municipal fields in connection with the visit of the Second Annual Michigan Air Tour. Big Rapids recently opened Roben-Hood field, a seventy-seven-acre tract. Twenty-four planes participated in an air show, held in conjunction with the opening. The formal dedication will be held Armistice Day. The field is operated by the local American Legion.

DEVELOPMENT of the Wayne County airport is rapidly nearing completion. The field is located at Middlebelt and Goddard roads in Wayne County, about fifteen miles southwest of Detroit. Two hangars, one for commercial and one for military planes of the Michigan National Guard, are completed, and a power house is in the last stages of construction. The field has been drained and leveled, and is provided with concrete runways built to the specifications of Wayne County's concrete roads.

SEVEN gilder clubs in Detroit and vicinity have organized the Michigan Council of Glider Clubs. Walker Morrow is president of the council.

GRAND RAPIDS was host August 9 and 10 to the air fair sponsored by the local flying club. Prize money amounting

(Continued on next page)

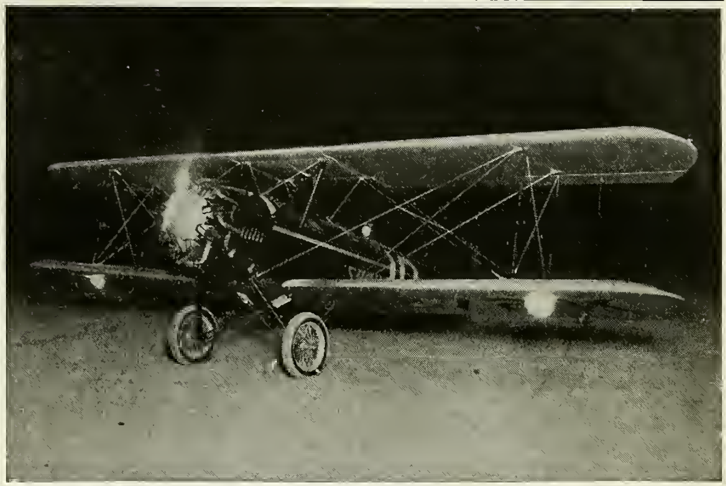
Use of the Gosport communication system enables an instructor to direct a student's training while in flight.

In all acrobatic flying ot the Sportan school bath instructor and student weor modern parachutes as shown here.

A Spartan training plane, photographed from a companion craft, during formotion cross-cauntry flight training.

Students in advance classes get valuable flying experience in this modern Spartan school cabin transoort.

Spartan C-3-165, pawered with the Wright "Whirlwind Five," one of the types of training planes used by Spartan.



SPARTAN TRAINING SPECIALIZES IN EVERY FORM OF FLYING

FLIGHT training at the Spartan School of Aeranautics intraduces the student-pilat to every form of flight he will experience as a cammercial pilat. First he learns the simpler maneuvers and masters landings in a dual-contral training plane equipped with the Gaspart system af communicatian between instructor and student. Steadily he progresses ta solo crass-cauntry work, cabin plane flying, sola flying in a high speed bi-plane, acrobatic and finally, night flying.

The Spartan Schaal of Aeranautics is ane af few in America licensed by the Department af Commerce as Transpart Graund and Flying schaal. This requires that all instructors and all training planes be Gavernment-licensed and that every Spartan caurse af instruction measure up to Gavernment standards.

COURSES—Spartan affers three caurses qualifying graduates for license examinations in the following grades: Private, Limited Cammercial or Transport Pilot. Each caurse includes technical, thearetical and business subjects.

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SPARTAN PREPARATORY COURSE—A very interesting and instructive series of illustrated lessans arranged in a clear and cancise manner has just been campleted by the Spartan staff. The course is divided inta twenty-four baaklets pertaining to airplanes, engines, metearalogy and navigatian, and represents an exceptional value. Price $5.00.

EMPLOYMENT SERVICE—Spartan aperates an emplayment service far students. Openings are investigated and expert assistance is given the qualified graduate in making a prafessianal cannection.

FREE TRANSPORTATION—Students entering the Spartan School are offered free transpartatian by air, rail or bus fram any paint in the United States. Camplete infarmatian will be forwarded an request.

SPARTAN SCHOOL OF AERONAUTICS

MAIL THIS COUPON

SPARTAN SCHOOL OF AERONAUTICS, TULSA, OKLAHOMA.

Gentlemen: Please send me literature ar infarmatian on subjects checked below:

☐ Illustrated baoklet describing all Spartan Caurses.
☐ How I may make use of the Spartan extended tuition payment plan.
☐ Further information pertaining to the new Spartan Preparatory Course.

NAME__________ AGE______

ADDRESS__________

CITY__________ STATE______

(Michigan News continued)

to $2,000 was awarded the winners of the various events.

[J. M. HILL]

A FLYING school license was recently granted to the Wolverine Aeronautical Corporation of Saginaw by Michigan Board of Aeronautics for ground and private pilot instruction. Waldo H. Newman, assistant secretary of the Saginaw Board of Commerce, is president of the school, which will operate from the Saginaw Junior Chamber of Commerce airport. The school is equipped with three Cabinaires and an American Eagle open-cockpit training plane.

WAYNE COUNTY airport, developed and managed by the Wayne County Road commission, has been designated an official port of entry for the East Coast of Michigan, according to a recent communication from the office of the Commissioner of Customs, Treasury Department, Washington, D. C.

PERMISSION to issue $15,000 in securities for the development of a lighting system has been granted by the Michigan Securities Commission to the Owosso Airport Company of Owosso. Fifteen hundred shares of stock will be issued, 1,000 of which will be preferred and the balance common.

Work has been started on the layout of the lighting system. Obstructions around the field will be lighted and the port will be illuminated with floodlights and a twenty-four-inch revolving beacon. Plans call for about forty boundary lights placed 280 feet apart.

Officers of the company are as follows: Ray Hall, president; Robert Wilcox, vice president, and Charles N. Wilson, secretary-treasurer.

THE Great Lakes and Southern Air Lines Company, of Detroit, has been granted permission by the Michigan Public Utilities Commission to issue 25,000 shares of stock of non-par value.

Authority to issue the stock was given on the condition that the capital of the company eventually be increased to at least $115,000. Main offices of the organization are at 1503 First National Bank building, Detroit.

Air service between Detroit and Wheeling, W. Va., and south to Miami, Fla., and between Detroit and Cincinnati to connect with the Louisville and Nashville Railroad for transportation to Atlanta, Ga., is planned by the firm. Interests at Louisville are said to be furnishing the financial backing.

WISCONSIN

EFFECTIVE September 1, 1930, Beloit, Wis., will be embraced for supply on C.A.M. 9, Chicago-St. Paul Air Mail Route, according to a recent announcement of the Post Office Department. A special cachet will be furnished by the department to the Postmaster at Beloit for use on such air mail as may be dispatched to C.A.M. 9 from his office on September 1.

The landing field to be used will be the one now serving Janesville, Wis. The westbound plane will leave this field at 8:30 a. m. and the eastbound plane at 5:10 p. m. daily.

[W. SCOLLARD]

THE Weeks Aircraft, Inc., and the Holterhoff Flying Service, Inc., of Milwaukee, merged recently. The new firm is known as the Weeks-Holterhoff Flying Service and is headed by Elling O. Weeks. Frederick Holterhoff is vice president of the combined company; Walter Mayer, secretary; and Eric E. Meyer, treasurer.

Directors include Mr. Weeks, Mr. Holterhoff, Mr. Mayer, Mr. Meyer, Clyde E. Hudspeth, Irving Buntman, L. J. Sauerborn, Rudolf Pabst and H. H. Bryant. Mr. Sauerborn is general manager of the concern and is in charge of the company's flying field at Brown Deer and its flying service at the Milwaukee County airport.

The concern has nine airplanes and has ordered three more. It is also planned to spend approximately 9,000 on the airport at Brown Deer.

HAROLD C. WESTFAHL, president of the Westfahl Airways, has announced the appointment of Ralph N. Weil as sales manager. The Westfahl Airways operate from both the Milwaukee county airport and from the Oconomowoc, Wis., airport.

JOINT air-rail service, with planes running up to the North Western road depot in Milwaukee, has been inaugurated by the Kohler Aviation Corporation and the North Western road. Three trips between Milwaukee and Muskegon and Grand Rapids, Mich., across Lake Michigan are made daily. The planes land in the harbor off Maitland airport, taxi to land over the airport ramp and then taxi to the train shed. A special runway has been constructed with the approval of the city.

ELMER H. LEIGHTON has been named sales manager of the new Weeks-Holterhoff Flying Service. He was formerly connected with the Kohler Aviation corporation as pilot on the regular transport line.

WITH the acquisition of a new Fleet Husky plane, Midwest Airways, operating a flying school at the Milwaukee county airport, has established a new training school at the Wisconsin Dells, according to Val Zimmermann of the Midwest company.

THE Nepco Tri-City Flying Service at Wisconsin Rapids has been approved by the U. S. Department of Commerce to give training leading to private, limited commercial and transport pilot's licenses. Maj. Leslie G. Mulzer is manager of the school.

A CITY ORDINANCE has been adopted by Appleton, Wis., which provides that "no aeronaut shall operate an airplane or other aircraft over the city while engaged in trick or acrobatic flying and that no machine shall fly at a height of less than 3,000 feet except for the purpose of taking off or landing." Penalty for violation of the ordinance is not to exceed a fine of $1,000 or in default of fine, not more than six months in the county jail.

THE new 105-acre flying field of the Racine Airways, Inc., near Racine, Wis., was formally opened August 3. Carl Burkert is manager of the field. Plans have been announced for the erection of a new $2,500-hangar at the field.

RICE LAKE AIRWAYS, INC., has been organized with headquarters at Rice Lake. The company will operate an airport and distribute aircraft. The incorporators are A. S. White, J. Spaulding and W. A. Cameron.

MINNESOTA

[H. A. LINDBERGH]

THE general contract for the construction of the combination hangar and administration building at the Williamson-Johnson Municipal Airport at Duluth has been awarded to A. Hedenberg and Company on their bid of $35,864. The structure is to be ready when the airport is dedicated September 13-14.

DR. D. D. MURRAY and Dr. F. N. Knapp of Duluth and Dr. Bertram S. Adams and Dr. Andrew Sinamark of Hibbing have been designated by the Aeronautics Branch of the Department of Commerce as the medical examiners for this district.

The Paramount Cabinaire, equipped with Townend ring


You don't want
VALVE TROUBLE
when you're at
"THE CEILING"
Van Dorn
Van Dorn
VALVE REFACER

NORTH DAKOTA

FOLLOWING the inspection of the airport at Hettinger, N. D., by Federal officials recently, it was recommended that the airport committee make such improvements that the field can be given the C-I-X rating by the Department of Commerce. The committee will request a rating when the improvements have been made. These include, removal of telephone poles on east side of field; installation of waiting room, phone booth, wind cone, gas pump; and grading of field.

The field comprises 160 acres deeded over to the county to make it free of taxes. Additional land is available for future expansion. Landing strips are 3,200 feet, 2,500 feet and 2,640 feet. Part of the surface is sown with grass and the remainder with alfalfa. There is a standard 100-foot circle. A fifty-foot by sixty-foot hangar has been constructed at the field.

Hettinger is located on the main line of the Milwaukee Railroad and on the proposed Northern Airway.

IOWA

[R. W. MOORHEAD]

THE Iowa State Fair, including an air show, was to be held August 20-29. The air show has been an important part of the fair for the past two years.

According to the announcement of A. R. Corey, secretary of the fair association, this year's show includes an exhibition of aircraft, including gliders and aeronautical accessories, and daily flying demonstrations and races.

DES MOINES is on the New Kansas City-Minneapolis air transport line inaugurated recently by the American Eagle Aircraft Corporation of Kansas City.

H. C. FOUNTAIN of Des Moines has been appointed Iowa representative of the Spartan School of Aeronautics at Tulsa, Okla.

MORE than 7,000 persons were present at dedicatory ceremonies of the new municipal field at Oskaloosa.

THE second annual air show was held at Carroll, Iowa, recently. Twenty-five pilots participated in aerial events. Attendance was more than 12,000. Included in the program was the christening of the Triad, a trimotor, four-place cabin monoplane manufactured in Carroll by the Saul Aircraft Company, of which W. I. Saul is president.

NEBRASKA

[J. R. LOWELL]

BOEING AIR TRANSPORT won the first round in its suit to prevent the State of Nebraska from collecting tax on its gaoline used in interstate business, when District Judge Chappell of Lincoln overruled the States' demurrer. The State may appeal on its demurrer or evidence may be adduced when the case comes up for a hearing on its merits. In any case, the suit probably will go to the Nebraska supreme court.

The Boeing company, engaged in operating planes between Chicago and San Francisco, claims that the State cannot collect the tax on fuel used in interstate traffic, but may collect on the gasoline used in intrastate. The company claims that collection on gasoline used in interstate business is a violation of the interstate commerce act.

A WINDSTORM late in July swept across the State of Nebraska, striking planes and hangars at three cities in the State with an estimated damage of more than $30,000. At the McCook Airport damage to planes amounted to $25,000 while the damage to the hangar was estimated at $2,500.

At Fort Crook, part of the roof of the Army hangar, housing nine planes, was blown off. The damage amounted to about $700. Damage to the planes was negligible. The hangar of the Mutual Flyers Club at the Lincoln Municipal Airport was completely destroyed by the gale. The two planes belonging to the club were not in the hangar at the time. The loss amounted to $500. The new hangar of the Lincoln Flying School at the same airport had a number of glass windows blown out.

THE Lincoln Aircraft Company has shipped an OX-powered Lincoln PT to the Club Salvadoreno de Aviacion Civil y Reservo, to be used by them in the training of their reserve officers at San Salvadore, Central America. J. Langford, president of the R & L Airways of El Paso, Texas, took delivery at the factory on a Lincoln trainer, powered with a Warner engine.

A GROUP of business men, intent upon securing an airport at Beatrice, have organized the Beatrice Airport Company. The following officers have been elected: D. W. Cook, president; Don Linn, vice president; Henry Schlachter, secretary-treasurer; and Dr. H. M. Hepperlen, Carl Wilke, Willard Adams, Charles Pyle, Don Linn, Henry Schlachter and D. W. Cook, directors.

AT Hay Springs, the Hay Springs Airways has been organized to operate a flying service in Northwestern Nebraska. The first plane, a Stinson Junior, has been placed in service.

THE Valley Glider Club, with ten charter members, has been organized at Scottsbluff, and has purchased an Eaglerock glider. The first unit will be restricted to twenty-five members. Don Everett is organization chairman.

THE Lincoln municipal airport sold more gasoline in July than during any month since it was established. Gasoline sold amounted to 6,450 gallons, in addition to 901 gallons donated for an air meet at the port.

NEW improvements at the North Platte airport, on the Boeing transcontinental line, include the establishment of a pilot balloon observation station from which weather reports are broadcast by radio every hour. Work has begun at North Platte on the new Boeing hangar. The structure is to cost around $40,000. The present frame office will be moved to a nearby location and will house a Federal airway weather bureau.

Boeing Transfers from Fort Crook to Omaha Municipal Airport

THE Boeing company has announced it will transfer its Omaha air activities from Fort Crook to the Omaha Municipal Airport, and build there a combination hangar and administration building, as soon as leases can be agreed upon. The Boeing decision is the immediate result of the approval, by the Omaha voters at the May election, of the plans to utilize future authorized bond issues without delay, to bring the field up-to-date.

The Boeing hangar will be 100 feet by 225 feet and, if the lease is agreed upon in the near future, is expected to be ready for occupancy this fall. Universal lines, required by contract to make delivery of mail at the Boeing field, will also move to this field. Transfer of Boeing activities to the airport will mean an expenditure of $65,000 for buildings, the employment at the field of fifteen ground employes and pilots, besides four radio men and four weather bureau men, now at Fort Crook.

Location of the Boeing company formally determines the ground plan of the municipal airport. A semi-circle of administration and ticket offices of the company will surround the present beacon. The Boeing hangar will stand to the immediate south and will include a "live" hangar at the east end, eighty feet by 100 feet, and a store hangar, 100 feet by 125 feet at the west end. On the north side of the latter will be rooms for mail, waiting room, rest room, radio room, boiler room, workshop and weather bureau quarters. Ships will taxi out on a concrete apron at the "live" hangar, in front of the semi-circle of administration offices and have straight access to the runways.

NEW companies engaged in commercial aviation in Nebraska include the following: Pioneer School of Aeronautics, Omaha, authorized capital stock $25,000, incorporators—Frank J. Grace, Francis D. Bowhan, J. H. McDonough, W. T. Scott and C. B. Grace; Pioneer Air Lines, Omaha, authorized capital stock and incorporators same as for Pioneer School of Aeronautics; Glider club at Lincoln with membership limited to thirty, Jack Kolbenschlag to be chief instructor; Omaha Flying Club, Omaha, authorized capital stock $25,000, incorporators—Chester E Beck, F. Jerome Lewis, and William S. Poppleton; Falls City Aircraft Co., Falls City, to deal in aircraft and carry pasengers and freight, authorized capital stock $20,000, incorporators—Ray Novak and Minnie Novak;

(*Continued on next page*)

(Nebraska News continued)

Union Holding Company, Lincoln, authorized capital stock $3,000,000, to be holding company for Sidles Airways corporation, Union Airport, H. E. Sidles Automobile company, and KFAB Broadcasting company, all of Lincoln. H. E. Sidles is president of the Union Holding Company, Lee Huff and C. L. Carper are vice presidents, and Charles Stuart is secretary-treasurer. The officers are the same that headed the Nebaska Buick Automobile Company which was sold early in June to the Buick Motor Car Company, of Flint, Mich.

KANSAS

SALES of the Supreme Propeller Company, Wichita, are increasing steadily, according to a recent announcement of officials of the company. The company reported that the development of low-horsepower planes and power gliders is on the increase and has stimulated the sale of small wood propellers. Preparations for an increased volume of business in the fall and winter have been started by the Supreme company.

THE Mooney Aircraft Company has purchased the factory formerly occupied by the Swift Aircraft Company, adjacent to the Wichita Municipal Airport, and will move from its present location with the Bridgeport Machine Works. The factory building and ten-acre site were bought from Arch Merriam, receiver for Swift. Reorganization of the company is under way, with more directors to be added to the board. It is planned to go into production of the low-wing cabin monoplane immediately. The Mooney is the plane in which A. W. Mooney, designer, completed a flight of 2,000 miles April 5, taking off from Los Angeles and landing at Fort Wayne, Ind.

CLASSES in glider instruction have been started by Braley Glider Corporation. The company has completed two Skysport gliders, and is working on three more gliders to be powered with small motors. Courses in primary and secondary training are given.

THE Stearman Aircraft Company has announced plans for a $330,000-factory to be erected this summer across the highway west of the Municipal Airport at Wichita. United Aircraft Corporation, of which Stearman is a subsidiary, closed a deal with Arch Merriam, receiver for the Swift Aircraft Company, for thirty acres of the Swift site. The cost is reputed to be $15,000. The new plant will be built in units. Austin and Company have the contract. Work started in July, and it is planned to have the new plant in production by early fall.

CENTRAL AIR COLLEGE properties were purchased recently by Newman and Truman Wadlow. They will form a company and operate under the name of Wadlow Brothers Flying Service, engaging in air taxi service, flying instruction, aerial photography and passenger carrying. The purchase includes the large concrete hangar on the Central Avenue airport, eight airplanes, repair shop equipment and office furnishings.

[E. W. PRYOR]

WADLOW BROTHERS' Flying Service has inaugurated an aerial ambulance service with a six-passenger Travel Air cabin monoplane. Two detachable seats have been removed and a stretcher installed.

ROYDON Aircraft Company has been granted a State charter. Directors named were J. G. Bailey, McPherson; K. K. Cox, M. B. Cox, A. A. Wolfe and M. H. Cundiff, all of Wichita. The company plans to produce a biplane to sell at a moderate cost.

DEAN Frank T. Stockton and W. F. Kessick, of the University of Kansas, are surveying the aviation industry of Kansas and will publish a bulletin of the industry in all its aspects in a few months. It will be an official publication of the university. Recently a bulletin entitled "Kansas City As An Air Center" was published.

MISSOURI

BIDS have been asked for furnishing all labor and materials and performing all work for an aerial survey of the Missouri River covering about 900 miles of the Missouri River from the mouth to Yankton, South Dakota; and for furnishing a Controlled Aerial Photographic Mosaic, in Atlas Form, of the Missouri River from Kansas City, Missouri (mile 397) to the mouth (mile 0), according to a recent announcement of Lieut.-Col. R. C. Moore, District Engineer.

AIRPLANES owned by students at the University of Missouri are to be under the same regulations as automobiles owned by students, according to a recent announcement by President Williams. Planes may be used by students if they do not interfere with studies and are registered with University officials.

[M. SHEETZ]

A BASE for seaplanes and amphibions will be constructed at Osage Beach on the 130-mile lake to be formed by the Bagnell Dam now under construction. The base will be used by planes of the projected passenger line from St. Louis to St. Joseph via Jefferson City to be operated by Jefferson Airways of Jefferson City.

NORMAN K. WARNER, who has been operating a branch flying school at Trenton for Consolidated Air College of Kansas City, has purchased the ships for student training and will continue instruction independent of C. A. C.

EQUIPMENT for the radio range beacon to be located on the north side of the Allton Airport, Columbia, has been received and is ready for installation.

THE Kansas City Civic Improvement Committee has formulated plans for the expenditure of $2,000,000 at the Kansas City Airport, which would bring the total investment at the airport to more than $3,000,000. Improvements would include the addition of 100 acres to the present field, the building of new runways, and the construction of a circular terminal building 450 feet in diameter and eighty-two feet in height. This structure would house fourteen planes of 100-foot wingspread as well as many smaller ships. A central tower would provide space for offices and a weather bureau.

ROY GODSEY, secretary of the aviation committee of Kansas City Chamber of Commerce, and Dr. John Brock have made a series of flights covering 3,500 miles, over Kansas City, Missouri, Nebraska and Iowa. The flights were made for the purpose of inspecting airports and formulating data on aviation developments in territory near Kansas City.

CONSTRUCTION of the new administration building at Fairfax Airport, Kansas City, has been practically completed. The building contains office space for concerns at Fairfax, a waiting room and dining room. A thirty-six-foot concrete roadway now under construction will shorten the distance from Kansas City to Fairfax by more than one mile.

ST. LOUIS

[A. W. LEAGUE]

AT Lambert-St. Louis Municipal Airport during June and July, 2,857 landings and 3,016 take-offs were made, exclusive of training and test flights. In June, 1,396 passenger planes landed and 1,505 departed. During July, 1,461 ships landed with pasengers and 1,511 departed. On

(Continued on next page)

The Mooney low-wing cabin monoplane

(Missouri News continued)

the basis of an average of five passengers to a plane, it is estimated that 14,300 persons departed and 15,000 arrived during the two months. This report includes all commercial operations.

A SYSTEM of runways which should prove adequate for several years is being completed at the St. Louis Municipal Airport. The present asphalt runways and the concrete and composition strip on the south side of the landing area are being extended to 3,000 feet each. A new oiled surface strip 4,000 feet long is being installed from the taxi lane at the southeast corner of the field diagonally across the landing area, meeting the taxi lane on the north side. Through a system of taxi strips the runways will be available from all hangars completed within a short time.

THE parking area at the Lambert-St. Louis Municipal Airport has been oiled and landscape gardeners have been employed to beautify the entrance and the section surrounding the parking area.

IN an effort to reduce operating expenses, the Southwest Air Fast Express has installed a centrifuge by means of which impurities are extracted from drained oil, permitting the oil to be used over again. About sixty per cent. of the oil—which was formerly thrown away—is saved through this process. Prior to the installation of the centrifuge the company purchased approximately 4,500 gallons of oil a month.

LIEUT. J. F. FISHER, commander of the St. Louis Naval Reserve Aviation Unit, is organizing a flying club in St. Louis to be operated under N.A.A. rules. The plans call for the purchase of one or more planes and the employment of a transport pilot who will instruct the members of the club.

WORK has been started on the new hangar for the Missouri National Guard Air Service at the Lambert-St. Louis Municipal Airport. Work on the hangar for the St. Louis Naval Reserve Aviation Unit, ground for which was broken by Rear Admiral Byrd, has not been started.

A RECENT ordinance passed by the Airport Commission of the Lambert-St. Louis Municipal Airport makes it compulsory that all planes carrying passengers be provided with liability insurance to the extent of $10,000 for each passenger carried.

OKLAHOMA

[W. H. WITT]

National Air Tour Sponsored by the Oklahoma State Chamber of Commerce

A NATIONAL air tour to be conducted by the Oklahoma State Chamber of Commerce is scheduled to start at Washington, D. C., October 15, according to a recent announcement of W. B. Estes, secretary of the organization. Final detailed plans were worked out at a special national committee meeting held in Oklahoma City August 16, according to Mr. Estes.

The trip will be staged by the Oklahoma Chamber with the coöperation of the United States Department of Commerce. The Governors of the thirty-six States visited, thirty-six U. S. senators and more than 100 members of the House of Representatives at Washington have been invited as guests of the tour.

Committeemen working in coöperation with the state Chamber of Commerce and with Ralph Berry of the state aviation committee in the formulation of plans for the tour are as follows: Col. Clarence Young, Assistant Secretary of Commerce for Aeronautics; Hiram Bingham, chairman of the aeronautics committee of the United States Senate; Nicholas Longworth, speaker of the House; Major Talliaferro of the Department of Commerce; R. E. Elwell of the Fokker Aircraft Company; and William B. Stout.

States entering the tour, scheduled to end at Tulsa, Oklahoma, sixteen days after the departure from Washington, D. C., will furnish the ships for transporting their official representatives and will stand the expense of the visiting guests.

The officials of the tour will arrange for press and official ships. All manufacturers have been invited to enter ships in the tour. Those entered include Spartans, from the Spartan Company of Tulsa, Okla.; three Keystone Patrician eighteen-passenger monoplanes, three Fokker Super Universals, one Fokker F-32 and three Ford trimotors.

This tour will be made for the purpose of securing a system of state and national laws concerning aeronautical legislation and to standardize airway markings.

THE Oklahoma City Chamber of Commerce, through its aviation committee, has joined the Brower's Air Service in petitioning the Post Office Department to designate as an air mail line the Brower passenger line from Oklahoma City to Omaha, according to H. C. Martin, committee chairman.

ACTUAL construction has been started on the $42,000-building program of the Garland School of Aeronautics, Tulsa. The program, when completed, will give the airport four new hangars for private plane storage, and in addition a $37,000-aerial photographic department. All work is expected to be finished and ready for use by the end of the summer.

BETWEEN fifty and sixty airplanes attended an air meet and air circus held recently at Miami, Oklahoma, under the auspices of the Miami Junior Chamber of Commerce.

A. L. McCUISTION, meteorologist at the Tulsa municipal airport, has announced the receipt of patent rights on his recently invented dew point indicator. The instrument contains two dials. By the coördination of the readings on the dials the pilot can determine the danger of fog formation, the formation of ice on the wings, and the height of the ceiling over his plane.

TEXAS

[C. MORRIS]

A FEATURE of the aviation program of the City of San Antonio is the placing of Winburn Field on a paying basis during the present fiscal year. For the fiscal year ending June 1, 1930, the city allowed $42,000 for operation and maintenance of field, while this year only $12,000 has been set aside, this amount to be used wholly for improvements and repairs.

WEDELL-WILLIAMS AIR SERVICES of New Orleans has opened a passenger service between Houston and New Orleans. Ryan cabin monoplanes operate east and west daily. Stops are made at Patterson, Lake Charles and Beaumont.

ADDITIONS to Love Field, Dallas, call for construction of a taxi strip of asphalt 150 feet wide running the length of the field, improvement of drainage, and the erection of a wind indicator on Hangar No. 2.

IMPROVEMENTS under way at the municipal airport, Lubbock, Texas, which was recently established, include the construction of a 120-foot by 80-foot hangar costing $22,000, the erection of a beacon light, and the building of a lean-to twenty-seven feet by 80 feet to house waiting rooms, shops, and offices. The hangar will be built of brick and concrete and will have a capacity of from ten to fifteen planes.

THE Abilene Flying Club has been organized at Abilene, Texas, by R. W. Dulaney, Jr. Ground school instruction has started and actual flying will begin following the purchase of a plane. Each student must pass a physical examination.

THE Department of Commerce survey of Texas is progressing rapidly, with about ninety-seven per cent of the surveying on the lap between El Paso and Fort Worth complete. Construction work on the Brownsville-Kingsville section of the Houston-Brownsville airway also is nearing completion. Extension Superintendents E. M. Haight, W. S. Kenyon and H. S. Souther are making the surveys and Engineer G. H. Horan is studying the field sites selected.

A CHAMBER OF COMMERCE regional conference on traffic problems and aviation progress has been called for Dallas November 6-7 by President William Butterworth of United States Chamber of Commerce. The convention will be attended by representatives from chambers of commerce, city officials, and aviation officials from Texas and adjoining states in

(Continued on next page)

TWIN PRECISION

Why are Superchargers

Which rotate at the highest speed in aeronautical practice —

equipped with

NORMA-HOFFMANN PRECISION BEARINGS

?

The answer lies in one word "PRECISION!"

NORMA-HOFFMANN BEARINGS CORPORATION Stamford, Conn.

(Texas News continued)

the Southwest. President Butterworth will be the principal speaker.

OPERATION of Western Air Express radio station at the Wichita Falls, Texas, municipal airport, has begun. The cost of installing the station was approximately $1,500. K. Singer has been detailed to Wichita Falls in charge of the station.

[R. THOMPSON]

MINOR changes in the ordinance levying a gas tax and license fees on operators and aviators at Love Field, the municipal airport, were enacted recently by the city commission, upon recommendation of Preston Sneed, director of airports.

Modification of the graduated $100-a-month license fee for flying schools, which was petitioned by several small operators, was not granted by the commission. A fee of $15 a year was levied against individual operators who occasionally teach students to fly for monetary compensation.

Transport and air mail companies, which store gasoline for private use, were charged $500 rather than $1,000 a year, if they operated not more than six ships. If transport companies sell gasoline they must pay the regular one-cent per gallon tax on all gas sold, the amendments specified.

The fee on companies and individuals who operate planes on passenger sightseeing trips was changed from $50 per month to $50 per year per ship.

A TOTAL of 943 ships landed at Love Field during July and 946 ships took-off. Figures showed a total of 970 pilots arriving and 982 departing while the total number of passengers carried totaled 1,573 arriving, and 1,499 departing on scheduled lines. The grand total shows that 1,952 persons arrived by air at Love Field in July and 5,024 persons departed.

Visiting planes landing at the airport totaled 285. Each ship spent at least one night at Love Field and was serviced there.

LOUISIANA

[C. F. COCK]

WITH the awarding of the contracts for administration building, hangar and paving work for the municipal airport at Shreveport, construction is proceeding and completion of the project is expected at an early date. The contract for field lighting was deferred at the City Council meeting July 22, when other contracts were awarded, and bids for this part of the airport were received August 12.

The contracts for hangar and administration building were awarded to W. M. Werner, general contractor, at $57,900, and the contract for paving was awarded to Emmett Cochran at $2,318. Six bids were received for the general contract. The administration building will be two stories in height and will contain a tower on which a beacon will be located. The building will be of stucco. Plans were prepared by Jones, Roessle, Olschner and Wiener.

THE contract for construction of the air terminal at Baton Rouge, La., for East Baton Rouge Parish, has been awarded to A. C. Stewart, of Baton Rouge, at $58,000, and construction has been started. The airport buildings, for which plans were prepared by Jones, Roessle, Olschner and Wiener, will be similar in many respects to the terminal at Shreveport.

THE municipal airport at Natchitoches will provide facilities for both land and seaplanes. The contract for the hangar was awarded to Percy Pruhomme at $12,108. The hangar will be 80 feet by 100 feet and will be located on the 250-acre tract of land bordering Chaplin Lake. This body of water extends for three miles parallel to the airport site and has a width of 150 yards. It will cost $35,000 to develop the airport.

ALABAMA

[O. G. JONES]

IN an effort to secure legislation favoring aviation in the State, the Alabama Junior Chamber of Commerce has asked candidates for the Legislature to favor a number of bills.

The Junior Chamber is especially interested in getting a bill passed which would give municipalities the power to buy tracts of land outside the city limits for use as municipal airports.

The organization is also favoring a proposed bill providing that all money collected from taxes on gasoline sold for use in airplanes be used for the benefit of aviation and not on the construction of public highways.

CONSTRUCTION of a new hangar at the airport at Andalusia was completed recently.

LIGHTING of the Atlantic-New Orleans mail line extending across Alabama will be made when a survey of the route has been completed by Government surveyors. Orders have been issued for the survey to be started immediately. The route is 500 miles long.

With the completion of this string of beacons the air mail line from New York to New Orleans will be completely lighted.

IMPROVEMENTS recently made at the field at Selma include the drainage of the middle section of the port. More than 1,100 feet of pipe were laid.

TENNESSEE

[R. F. ASH]

PLANS are under way for the organization of an aviation club by students of Southwestern University. It will be limited to twelve members and will be composed of student fliers. Malcolm Gibbons and J. W. P. Fleming are the Southwestern flying "veterans." Gibbons has sixty flying hours to his credit. Fleming, who owns his own plane, has more than eighty hours. Other students who are studying aviation are Dick Monk, Ronald Hayho and Mary Gardner Patterson.

McGEE TYSON Airport at Knoxville, Tenn., was recently dedicated. Knoxville's new airport, sponsored by the Knoxville Aero Club, is located six miles west of the city. The field is 800 feet by 900 feet. A hangar has been constructed at a cost of $20,000. The Gulf Refining Company is constructing a clubhouse.

UNITED STATES DEPARTMENT OF COMMERCE has leased a site about three-fourths of a mile southeast of the Memphis Municipal Airport, with option to purchase in 1930. The site incorporates two tracts of slightly more than two acres each. The Department of Commerce will erect a radio broadcasting station for aviation weather reports.

The station will broadcast weather reports at half-hour intervals on a frequency of 385 kilocycles. The impulses of the Memphis radio will be heard by pilots through short-wave receivers in planes within 200 to 300 miles from Memphis. Weather information will be transmitted from one radio terminal to another by telegraph at first and later by special teletype circuits.

ARRANGEMENTS to merge the Memphis Aero Club and the local unit of the National Aeronautic Association were begun the last meeting of the Aero Club.

Howard Stovall is president of the Aero Club. H. Huston is the governor of the N. A. A. chapter here.

A RECORD in Memphis for the number of passengers taken on air rides in a single day was made recently at the Memphis Municipal Airport by the Curtiss-Wright Flying Service. In the four and a half hours from 2 to 6:30 p. m. five planes carried a total of 385 passengers. They were carried for a penny a pound. The average price paid per passenger was $1.29.

[J. S. LINDSEY]

THE Curtiss-Wright Corporation recently sent a delegation to Chattanooga to investigate the possibilities of opening a flying base at the New Municipal Airport, Lovell Field. If the location is desirable the company will construct a hangar and install the necessary equipment to carry on operations.

VIRGINIA

THE city authorities of Roanoke, Va., have obtained 130 acres of land and started the development of an airport known as the Roanoke Municipal Airport. The field is six miles north of the business center of the city and is reached by an improved highway in a few minutes.

Two runways have been graded; they are approximately 500 feet wide and 1,800 feet long. Construction of a hangar sixty feet by 100 feet, of all-steel construction, has been completed.

The Roanoke Municipal Airport has been leased to two local flying men who are in a position to render service to any plane which may desire to visit this city. The

(Continued on next page)

(*Virginia News continued*)

airport has not as yet been completely lighted. A lighting system will be installed some time in the near future.

SOUTHERN LANDINGS

[R. F. ASH]

AFTER a controversy for several weeks, a lease giving the city of Little Rock, Arkansas, possession of the United States intermediate airport was formally signed recently by members of the city board of public affairs, and White Brothers of Russellville, who leased the entire air depot properties from the Government.

Sixteen of the eighteen members of the city council have signed an agreement to ratify the lease, making it possible for the city to secure immediate possession of the landing field.

Under the terms of the lease between the city and White Brothers, the city is to pay $3,000 a year rental on the airport, keep the field in condition and maintain the equipment for use of the field at night. Lights on the field were installed by the War Department before the airport was abandoned by the Government.

McLEMORE ELDER, Brys' Airport pilot, has been appointed instructor in the newly organized flying school of the Columbus Airways at Columbus, Miss.

LELAND, Miss., ten miles east of Greenville, is rapidly becoming airminded. Four planes participate regularly in the activities at the field and eight student aviators are receiving instruction from Glen H. Hoffman of the Finklea-Hoffman Air Service Company, operators of sight-seeing, cotton-dusting and student flying planes.

THE Columbus Airways, an organization specializing in passenger hopping, cotton dusting and student flying, was organized at Columbus, Miss., recently. Officers of the company include: Sam Kaye, Jr., president, and Herman Owens, secretary-treasurer; stockholders include D. S. Cox, H. M. Pratt, T. J. Locke, T. A. McGahey, L. E. Walker, A. H. Deyare, J. H. Watkins, W. E. Gilmore and Edwin Hardin.

INTERSTATE AIRLINES planes, flying on night schedule between Chicago, St. Louis and Atlanta, and on day schedule between Nashville, Chattanooga and Atlanta, carry an average of 343,200 air mail letters a month, according to a recent announcement issued at the company's headquarters office at Sky Harbor, near Nashville, Tenn.

With the inauguration of night flying on 1,650 miles of the 2,072 miles flown every twenty-four hours by mail planes of Interstate Airlines, poundage has shown an increase of more than fifty per cent. An average of 4.29 tons of air mail is transported over the Interstate routes every month.

Seven pilots are employed on regular duty to fly the day and night routes operated by Interstate. Two others are detailed at points along the lines as reserve pilots. Pilots Ledbetter, Rousch and Fricks are stationed at Atlanta, Ga., and Pilots Hammer, Ator and Pricer are stationed at Chicago. Larry Harris and Billy Van Dyke are reserve flyers.

Warns Airports to be on the Alert for Alleged Swindler

A WARNING to the personnel at flying fields to be on the alert for a confidence man who is alleged to have swindled several airport managers was broadcast last month by C. S. Chisolm, chairman of the board of governors of the Charleston Airport, Charleston, S. C. This man, according to Mr. Chisolm, falsely obtained $19 from him on the pretext that he was an aviation mechanic out of work and needed assistance to get home, promising to return the loan. According to Mr. Chisolm, J. Paul Herman, pilot of the Curtiss-Wright Flying Service, East Boston Airport, Mass., was similarly victimized.

He identifies himself as C. F. Decker of North West, Pa., according to Mr. Chisolm. Letters to the Chief of Police in that city have brought the information that a man of that name is known by the police there and that he has allegedly practiced this swindle at various flying fields. He is about five feet ten inches in height, weighs about 175 pounds and has light eyes and red hair.

Interior of Plane in Flight Portrayed in Broadway Production

ONE of the most notable recent examples of the tendency toward more accurate public representation of things aeronautical is the airplane scene in David Belasco's new play, "Dancing Partners," at the Belasco Theatre in New York. In the progress of the plot, the hero and heroine have occasion to hold a rendezvous aboard a French airliner. By an ingenious arrangement, a cross-section of the interior of the plane is shown upon the stage. To enhance the impression, the nose, tail section and wing of the ship are represented, though so dimly as not to require detail or to distract attention from the center of interest—the cabin interior.

Although the interior decoration is somewhat more ornate than we are accustomed to in American planes, it is a fairly faithful reconstruction of types found in Europe.

But it is in simulating the motions of a plane taking off, flying and landing that this device is most impressive. At the beginning of the scene, when the plane is supposed to be on the ground, the floor of the cabin is inclined aft as though the tail were resting on the ground. As this pseudo-plane starts to take off, the ground objects seen through the windows on the far side of the cabin move past; the cabin floor comes up level to indicate that the pilot has pulled the tail off the ground; and then, as the tail is depressed slightly, the plane appears to rise, the trees and buildings disappearing below the window sill. When the plane is supposed to be in the air, the sensations of climbing, being buffeted about by gusty air and gliding down to a landing were well portrayed, as is the landing itself.

A CROSS-COUNTRY business trip by air was started at Washington, D. C. August 11 by J. H. Duffee, vice president of the Prest-O-Lite Storage Battery Corporation with headquarters at Indianapolis. He flew in the *Vision of Prest-O-Lite*, the plane which during the past twelve months has flown to the four corners of the United States, visiting Portland, Me., Miami, Fla., Bellingham, Wash., Los Angeles, Calif., and intermediate points.

On the most recent trip, Mr. McDuffee held a series of group meetings of Prest-O-Lite battery dealers and distributors at Marietta, Ohio, Pittsburgh and Harrisburg, Pa.; Baltimore, Md.; Washington, D. C.; Roanoke, Johnson City, Danville, Norfolk and Richmond, Va., arriving in New York City for a meeting of metropolitan dealers on August 19.

A BULLETIN entitled "Gliders and Gliding," written in non-technical terms, has been published by the Aeronautics Branch of the Department of Commerce. The booklet was prepared for the purpose of encouraging the development of gliding in the United States as a sporting and recreational activity and as a medium for furthering interest in all phases of aeronautics.

ECONOMIES in the upkeep of buildings constructed of wood effected by the use of chemically treated lumber is discussed in a bulletin entitled, "Treated Wood, Its Uses and Economies," recently published by the National Committee on Wood Utilization of the Department of Commerce. The bulletin explains how the use of treated lumber in certain parts of a building will prolong the life of the structure.

The Overcashier high-wing cabin monoplane

NEW PUBLICATIONS

Brief Reviews of Texts, Handbooks and Novels of Aeronautical Interest

Manual of Flight
By CAPTAIN IENAR E. ELM

WRITTEN for the general flying public, this book contains both elementary and advanced discussion of flying maneuvers and problems. Considerable discussion is devoted to the problems of the student pilot and elementary flying. The instruction of the student pilot is described in detail, augmented by numerous diagrams and photographs.

Other subjects treated are aerobatics, emergency flying instructions, and parachutes. Appended to the other material in the book is a dictionary of aeronautical terms. The text is illustrated.

The Evolution of the Flying Machine: Balloon, Airship and Aeroplane
By HARRY HARPER

IN his book, "The Evolution of the Flying Machine," Mr. Harper traces the subject of aeronautics to the beginning indicated by historical documents. He follows the development of flying machines from the first crude heavier-than-air craft without mechanical power and the hot air balloons which were "rowed" through the air, to controlled, power-driven flight in an engine-driven heavier-than-air machine.

Aeronautical Meteorology
By WILLIS RAY GREGG

"AERONAUTICAL METEOROLOGY" supplies in convenient form the useful information needed by airplane pilots without discussing the more complicated phases of the subject of interest particularly to meteorologists. The book is written in a simple and concise form to provide a quick, direct means of acquiring a fundamental understanding of practical, every-day meteorology.

The Seven Skys
By HARRY F. GUGGENHEIM

MR. GUGGENHEIM has prepared this volume as an authoritative and straightforward record of the scientific and social problems involved in the development of aviation. Beginning with the story of the history of aviation, he traces activity in aeronautics to the end of the early pioneering days and to the industrial era in which the airplane is classified as a practical utility. He discusses, in general, the development of the airplane and its facilities for navigation; and the public knowledge of its development.

Twenty Thousand Miles in a Flying Boat
By SIR ALAN COBHAM

SIR ALAN COBHAM and Lady Cobham were influential in developing the modern African air transport. The successful completion of their flight around the Continent of Africa aroused Governmental interest in African air routes.

Sir Alan's book is written in narrative style, and contains some forty-six photographs taken by his own photographer; some are aerial views and some ground.

"Twenty Thousand Miles in a Flying-Boat" is simply and clearly set forth, and will be of interest to those interested in aviation, whether or not they are members of the aeronautical industry.

THE Thompson Aeronautical Corporation of Cleveland, Ohio, has appointed the following companies service and parts dealers of Wright engines: Wright and Esenwein, Buffalo, N. Y.; Main Aeronautics, Greensburgh, Pa.; and Curtiss-Wright Flying Service, Pittsburgh, Pa. The distributor franchise territory awarded the Thompson company under a recent agreement with the Wright Aeronautical Corporation includes Western New York, Western Pennsylvania, Northern West Virginia and Northern Indiana.

GENERAL AVIATION has been purchased by Flyers, Inc., from the Eastern Aeronautical Corporation of Newark, N. J. Flyers, Inc., was organized by Robert Aldrich in Albany in 1927. Gordon K. Hood is general manager; C. H. Bennum, chief instructor; Alden D. Wooster, airplane mechanic; Edward Boss, engine mechanic; and Fritz Hall, in charge of the line.

4 WORLD'S RECORDS FOR SIKORSKY!

AND, OF COURSE, STANAVO AVIATION ENGINE OIL WAS USED EVERY TIME . . .

And that isn't all. As Capt. Sergievsky points out in his letter, the Sikorsky S-38 also holds 5 American records—a total of 9 altogether. And all these record hreaking performances were made with Pratt & Whitney engines lubricated with Stanavo Aviation Engine Oil.

What a record this oil has made! Only a year on the market, and it is in use hy transport companies which are operating the majority of all the transport planes in the United States. Everywhere known as the "custom huilt, flyers' oil," Stanavo is specified for airplane engines of all types. Whether you own a private plane, or whether, in any way, you influence the purchase of lubricants for commercial planes, you can choose no finer oil than Stanavo—availahle at all the larger airports and landing fields, from Maine to California.

SIKORSKY AVIATION CORPORATION
BRIDGEPORT AIRPORT
BRIDGEPORT, CONN

TEL. STRATFORD 1800

August 5, 1930

Stanavo Specificetion Boerd,
26 Broadway,
New York City.

Gentlemen;

Flying es a seeplane our S-38 has recently esteblished the following world records with useful loads:

Altitude with 2,000 kilograms
Altitude with 1,000 kilograms
Altitude with 500 kilograms
Speed with 2,000 kilograms

The altitude reached with a load of 1,000 kilograms wes 28,000 feet and exceeds the old seaplane record of 20,961 feet held by Germany, end elso the land plane record of 26,538 feet held by France.

The speed record 143.8 m.p.h. on a 100 kilometer course is elso a record for all classes of plenes with a load of 2,000 kilograms. The old land plane record wes 138.9 m.p.h.

As these records were made using Stenevo Aviation Engine Oil it gives us e great deel of pleesure to be able to write you about them. In eddition to the four world records we hold five Americen records, making e total of nino records credited to the Sikorsky S-38 and ell obtained with Stanavo Oil.

Very truly yours,

SIKORSKY AVIATION CORPORATION

B Sergievsky

Boris Sergievsky

H

STANAVO
AVIATION ENGINE OIL

One Brand — STANAVO. One Quality—the Highest—Throughout the World.

STANAVO SPECIFICATION BOARD, Inc.

Organized and maintained by

Standard Oil Company of California
225 Bush St., San Francisco

Standard Oil Company (Indiana)
910 S. Michigan Ave., Chicago

Standard Oil Company of New Jersey
26 Broadway, New York City

EMPLOYMENT QUALIFICATION

(*Continued from page 72*)

service to offer—not just a thrill. As a result, men who formerly were endeavoring to secure pilots' licenses are now training themselves for positions more suitable to their own characteristics.

In the first years of organized transportation of passengers by airplane, pilots were employed only on the merits of their technical experience and capabilities. A pilot was a factor of supreme importance. Now, many other factors are considered in employing a person who can be trusted with several thousand dollars' worth of airplane and its priceless cargo. In our company, so far as technical training is concerned, the minimum number of hours required is 1,000, and of course it is necessary to hold a transport pilot's license. But the personal side must also be considered. One of the most important characteristics of a prospective pilot is his ability to harmonize in association with superiors, equals and the public. Can he perform company routine in the handling of an airplane without causing friction? And, can he mix with the persons he carries in such a manner as to reflect the spirit of courtesy, carefulness and efficiency which characterizes the company?

The future of air transportation depends on public confidence. All employees must assume some of the responsibility for creating public confidence and good-will regardless of personal desires.

No one can foretell with accuracy the rate of growth of air transportation. If at present there seems to be an oversupply of available personnel in many of its branches, it is more than likely that a future period of rapid growth will readily absorb this surplus. Therefore, I should advise any person who is vitally interested in this new field of endeavor, who realizes its enormous possibilities and who is willing to devote his life to utilization of the airplane, to make ready now for that which is sure to come.

Fire-Proof Mail Bag

FOLLOWING several years of experiments and tests conducted by the Bureau of Standards under the supervision of officials of the Department, it was announced recently by Assistant Postmaster General Glover that new fire-proof mail bags will be used on the night air mail service between New York and Chicago beginning not later than September 1. They will be used on other night air mail routes just as soon as practicable.

Slightly larger than the pouch at present in use in the air mail service, which is twenty-four inches wide by forty-one inches high, the new fire-proof mail bag is made of 100 per cent pure asbestos, with lining, inside and out, of high-grade canvas, is steel riveted on sides and bottom, has a triple closing device, which prevents flames from penetrating the bag through its neck. The staples used in the bag are made of steel and the rivets are also of steel with copper coating. The pouch is quilted with steel rivets to prevent disintegration of the asbestos in case of fire. It weighs fifteen pounds.

The particular asbestos used in the construction of the new bag was subjected to an actual fire test and withstood the heat perfectly.

The greatest difficulty encountered in developing a satisfactory fire-proof bag was in preventing the hot air caused by the fire from reaching the interior of the bag. In the new bag air pockets prevent the intense heat from reaching the contents of the pouch. This is taken care of by a quilting arrangement used in the construction of the bag.

Loss of air mail through fire since the inauguration of the service has never been very great. For the fiscal year ended June 30, 1930, the total number of pounds of mail carried in the air was 7,715,741, while the number of pounds of mail lost through fire was but 4,863 or a percentage of but .00063. But the Government, in adopting the fire-proof mail bag, intends to afford every protection to the mail which is carried in the air in order that the extremely slight loss through fire will be entirely eliminated.

EUROPEAN LIGHT PLANE TOUR

(*Continued from page 59*)

Von Oertzen retired. This accident was the more regrettable because it involved the withdrawal of the Albatros machine, which is an entirely new model constructed wholly of metal, fabric covered. Its performance would have been very interesting. The Polish pilot Rutkowski withdrew at St. Inglevert because of mechanical difficulties. Also Fauvel, who piloted the Mauboussin, retired after a forced landing in which his plane was damaged.

Because the weather in the Pyrenees developed into a full blizzard, all attempts to cross the mountains were strictly prohibited and competing machines began to assemble in large numbers at Pau, the last stop on the French side. Fourteen planes had already succeeded in reaching Saragossa, among them the German pilots of second class machines, Morzik, Poss and Pasewaldt. This leading group also included Broad, Thorn, Butler and Carberry. Lady Bailey had attempted to cross the mountains the previous afternoon, but had been forced to return to Pau.

Although the fliers on the French side of the Pyrenees were detained, the contestants in Spain were able to continue even though the weather there, too, was anything but satisfactory. Butler's Moth monoplane was the first to reach the last Spanish stop, Barcelona. The next step for the head group was the flight across the Gulf of Lyon to Nîmes, and thence to Lyons and Lausanne. In addition to Butler, the leaders included Thorn, Broad, Morzik and Poss. Durng the day a second Spanish competitor, the Duke d'Estremera, flying a Moth, was forced to retire. He made a forced landing at Bordeaux and wrecked his machine. This left fifty-four fliers in the contest. (*Continued following page*)

The deadlock at Pau continued all next day, July 24, thirty-nine planes being grounded there. A tempest was still blowing in the mountains. Stutz in his Arado with an inverted Argus engine came into Pau with motor trouble and was forced to retire. The number of competitors was therefore reduced to fifty-two—still a good number in view of the weather conditions.

Because of the two days' delay at Pau, the arrival time at Berlin, originally fixed for July 31, had to be extended two days for all machines that had arrived in Pau on or before July 23, and those arriving later were given only one extra day.

In the meantime, the leaders in Spain continued. In parts of Spain, as in Catalonia, the weather was good, but near the Pyrenees it was as bad as before. On the morning of the fifth day Butler's machine took off at Barcelona for Nimes and was followed in quick succession by those of the four other fliers at that city. Of those following, Plessis in his Renault-powered Caudron arrived at Barcelona at 10:45 a.m. He had overstrained his engine doing 200 kilometers per hour and was forced to make repairs. Carberry came in next. He had left Saragossa two hours before Plessis but had encountered a blinding snowstorm from the Pyrenees and lost his way. An hour later the only remaining Spaniard, the Archduke of Habsburgo-Borbón, arrived after a strenuous flight similar to that of Plessis.

Of the five men in the leading group, Captain Broad was the first to reach Lausanne in Switzerland, where the clouds hung very low. He arrived there at 1:40 p.m., followed closely by Butler. Some time later Thorn, Morzik and Poss landed.

On the sixth day, July 25, Dr. Pasewaldt in his Argus-powered B.F.W. landed at Lausanne at 8:22 in the morning. The weather was, if anything, worse than the day before, and the location of the airport had to be signalled to the pilots by green rockets. Arrachart was not able to land at Lausanne at all. After searching for the airdrome for an hour, he flew to Geneva and landed there. Captain Strub, president of the Swiss Aero Club and in charge of the organization in the Lausanne airport, was killed by the premature explosion of a rocket about to be shot up to guide Arrachart.

The machines held up at Pau were not able to continue the flight before the morning of July 25, when thirty-five of them crossed the Pyrenees. Four machines remained behind in France.

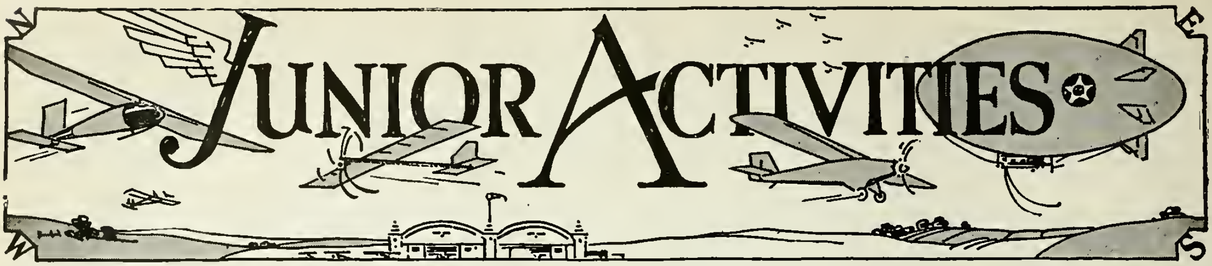
On this day the leaders separated; Broad. Butler, Thorn and Poss with a strong tail wind giving them a speed of more than 150 miles per hour, reached Breslau. Morzik dropped back and remained overnight at Prague, while three other machines stayed at Vienna.

The weather was still exceedingly bad. On the morning of July 26, the Breslau airport was shrouded in fog so that the pilots had to wait for hours before they could take off. The next stage was Posen in Poland, where Butler had to replace his propeller and was according disqualified, inasmuch as he had not carried a spare one. But he has entered protest, decision on which is pending.

A fatal accident occurred at Lyon, when the German pilot Offermann in his Siemens-powered B.F.W. flew into the aerial of a military wireless station. Both the pilot and his passenger were instantly killed. The ship built and entered by the Darmstadt college of engineering, and piloted by Neininger, made a forced landing in the Gulf of Lyon, but fortunately the occupants were rescued by a steamer 100 yards away. The plane was salvaged. The cause of the accident was a fractured cylinder on the Genet Major engine.

On July 27, eighth day of the air tour, the weather cleared up somewhat round about Berlin. But elsewhere—at Bern, Vienna, Prague and Breslau—take-offs were prohibited for several hours. On the Danzig-Berlin route the weather was passable, although a strong head wind was blowing. Nine machnes succeeded in reaching Berlin-Tempelhof airport, where about 15,000 spectators had congregated to receive them. The first competitors to arrive were Broad and Butler, who crossed the line almost simultaneously. They arrived at 4:33 p.m. Twenty-six minutes later Poss and Thorn arrived. Poss, flying his light Klemm machine with Argus motor, was the first man in with a machine of the lighter class and he naturally was the object of particular acclaim on the part of his countrymen. A quarter of an hour later Morzik arrived, and at 5:29 p.m. the Frenchman Finat crossed the line. After him Dr. Pasewaldt came in, flying an Arado belonging to the heavier class; he was followed by the Archduke of Habsburgo-Borbón and the Englishman Andrews.

Those who arrived the next day were Carberry, Lady Bailey, Miss Spooner, the German Polte, the Frenchman Arrachart and the first Pole, St. Plonczynski. The women pilots deserve especial credit, for, after being detained two days at Pau before crossing the Pyrenees, they made up a whole day. Lady Bailey had a mechanic on board, but Miss Spooner and Mrs. Butler did their own mechanical work.



HORROCKS' Twin Pusher CANARD

An "A" Frame Model Worthy of Study

By

R. E. DOWD

SOME of our readers have doubtless wondered why we have not taken up the study of a model of the conventional "A" frame twin pusher type. Perhaps of all types of models this is the best known. Year after year contests have been won by the old reliable A frame. Even in the face of keen competition this year, Joseph Ehrhardt of St. Louis won the A. M. L. A. outdoor senior duration with an A frame twin pusher, which made a flight of six minutes and 25 seconds.

It is the dependability of the A frame twin pusher that has made it such a favorite with model builders everywhere.

For this reason alone we should give this type of model some careful thought. Now, the Horrocks' "Fi Fi" will probably not win any contests for you, but it will serve as a representative type for study. Personally, I feel that for maximum performance, the single pusher canard type along the lines of the Watkins' floater (described in July AERO DIGEST) will eventually take the lead. Perhaps, if this type were taken up by some of our new champion builders, we should have a surprise in store for us. This, however, based on theoretical considerations, is conjecture. The championship performance of the A frame twin pusher is a fact, proved again and again. So let's look it over for those points which give it this advantage.

In the first place the frame construction is triangular, which is the basis of practically all engineering construction such as bridges, trusses, etc. The apex of this triangle is at the nose to take shocks on rough landings and distribute them back to the model through the frame members. The rear cross member serves as a convenient member for attaching the twin propellers.

As we consider the twin propellers and motors, further advantages are apparent. Suppose, for example, our finished model weighs all complete 2½ ounces. Now, if the model has a gliding angle of *one in five*, we have the key to our propeller thrust requirement. It will be approximately *one-fifth* of our total weight or one-half of an ounce. In the twin propeller type of model this means one-quarter of an ounce thrust per propeller. With this small requirement we can use but few strands of rubber, and we all know that the fewer strands used the more turns we can wind our motor, and therefore we can get a better duration. This all sounds favorable so far. Last month we covered the question of twin propellers versus a single propeller in connection with the Kwei Racer. It was pointed out that in a single propeller model the resistance is invariably less, therefore the gliding angle is better, and as a result the required thrust is less. The question is just how much—how much is gained and how much is lost. The success of the A frame type would seem to indicate that, generally speaking at least, the division of the rubber power into two systems works to advantage.

Another point about twin pusher models is the freedom from propeller torque, since the propellers turn in opposite directions and balance each other. We have had a system of single propeller torque correction explained in the January 1930 issue. This seems to work perfectly and would therefore cancel out the apparent advantage of the twin pusher.

Because of the triangular arrangement of the rubber motors, the line of thrust of the propellers is not straight forward and parallel with the line of flight, but both propellers are pushing against each other. It cannot be disputed that there is a loss of power resulting from this. If we had a little experience with mechanics we could figure out just how much. At this time it is sufficient to say the proportion of the loss to the actual effective thrust is in the ratio of one-half the propeller diameter to the length of the frame measured from front to back. In the Horrocks' Fi Fi this would be about 6 to 40, or almost one-seventh of the total. Naturally this is not favorable. There seems to be, however, an advantage in directional stability with this arrangement, since as the model yaws (flies crabwise with the actual line of flight) the propellers meet the air at different angles, resulting in a quick correction to straight flight.


Horrocks model with fin in rear

A real practical advantage is the location of the propellers in a twin pusher. They are protected from ground impacts in landing and shocks resulting from collisions in flight. The canard, or "tail first," arrangement of plane and stabilizer is usually used with the twin pusher A frame. This means that the full length of the long frame is used for mounting the surfaces, and the broader mounting is at the rear where it is needed most to anchor the main plane securely.

These may be taken as the more important features of the A frame twin pusher type. Perhaps, you have never considered all of them before. I hope that they will induce you to think about them, for one could build numerous models year after year and not get nearly so much out of it as by making fewer models and thinking more about them. Like designers of large airplanes, junior designers should have reasons for doing each thing. Right there is where we are training ourselves as we work with our hobby.

To return to our model, the Horrocks' Fi Fi was designed and built by Mr. Chester L. Horrocks of Los Angeles, California. Mr. Horrocks explains that the name was contributed by his little son, Chester, Jr., who said "Fi Fi" every time he saw the little plane. How's that for air-mindedness? Granted Chet, Jr., is a little weak on the pronunciation but certainly strong on the idea of "fly fly."

Fuselage or Frame

The most unusual feature about the construction of the frame is the removability of the lateral members, which allows easy folding into a very compact space for carrying. The main members are of straight-grained, well-seasoned spruce, pine or basswood, and are tapered from 3/8 inch diameter at the center to 1/4 inch diameter at the ends. No "cans" are used because of the strength of the frame. The center lateral brace is of the same material 4 15/16 inches long. The ends are 1/8 inch in diameter and the section is streamlined and tapered to 1/8 inch thick by 1/4 inch wide at the center. The rear lateral member, the ends of which serve to mount the propeller bearings, is made of birch. Its section is streamlined throughout, tapering from 1/2 inch wide by 3/16 inch thick at the center to 1/4 inch wide by 3/16 inch thick at the ends. As may be seen by referring to the drawing, the tapering occurs only on the front edge of the stick.

Sheet brass approximately .010-inch thick is used for the sockets and fittings throughout the frame. The fittings used at the junction of the rear cross member and the main frame sticks are formed into a tubular socket with split ends, which are wrapped around the cross member. A $\frac{1}{16}$-inch inside diameter by $\frac{1}{8}$-inch outside diameter brass tube $\frac{3}{8}$ inch long constitutes the bearing for the propeller shaft. A strip of brass is wrapped around and soldered to this tube. It is this strip which "clips" over the end of the cross member. This fitting as well as the socket previously described is securely lashed to the cross member.

The short cross member is held in position by two sockets, which are lashed to the main frame sticks. A hole in the small semicircular corner webs of these sockets serves to attach the guy wires, which tie in the whole frame together. The front end of the frame is held together by a cap socket through which the $\frac{1}{16}$ inch diameter anchor hook for the rubber strands passes.

Main Plane

The main plane is of the two-spar, double-surface type. Both spars are of spruce, pine or basswood. The front spar is $\frac{3}{32}$ inch thick by $\frac{3}{8}$ inch deep; the rear is $\frac{3}{32}$ inch by $\frac{7}{32}$ inch. The section is rectangular and uniform throughout except for a slight taper from the end rib to the $\frac{1}{16}$ inch by $\frac{1}{32}$ inch bamboo wing tip outline. The leading and trailing edges of the surface are of bamboo $\frac{1}{32}$ inch by $\frac{1}{8}$ inch. The ribs are of uniform section, each being composed of two $\frac{1}{16}$ inch by $\frac{1}{32}$ inch strips of bamboo formed over a spirit lamp flame and lashed to the spars. One strip runs over the spars and the other under. These strips are drawn together at the leading and trailing edges. The rib spacing is 2 inches at the center and 3 inches at all other points on the span.

As indicated on the drawing, the wing tips have been given a slight upturn or wash out, which means that the angle of flight reduces toward the wing tip. In constructing the frame, however, this upturning of the tips need not be overdone, since the doping of the Japanese rice paper covering will draw the tips up. The exact value of such upturning of the tips is a matter of conjecture. In model work it is safe to say that in most cases upturned tips simply "happen" during the process of doping.

Stabilizer

The stabilizer is entirely of bamboo with the exception of the main spar which is of spruce, pine or basswood. This spar is soaked in hot water and bent into a sweepback and also a dihedral. It is $\frac{5}{16}$ inch wide by $\frac{1}{8}$ inch thick at the center and tapers to $\frac{3}{16}$ inch by $\frac{1}{16}$ inch at the tips. Each rib is composed of two strips of bamboo $\frac{1}{16}$ inch wide by $\frac{1}{32}$ inch thick. These strips are lashed to the spar one on top and the other on the bottom. They are formed into a good section of rather high curvature, and their ends are lashed to the $\frac{1}{16}$ inch square bamboo outline. Covering, as in the main plane, is doped-on Japanese rice paper.

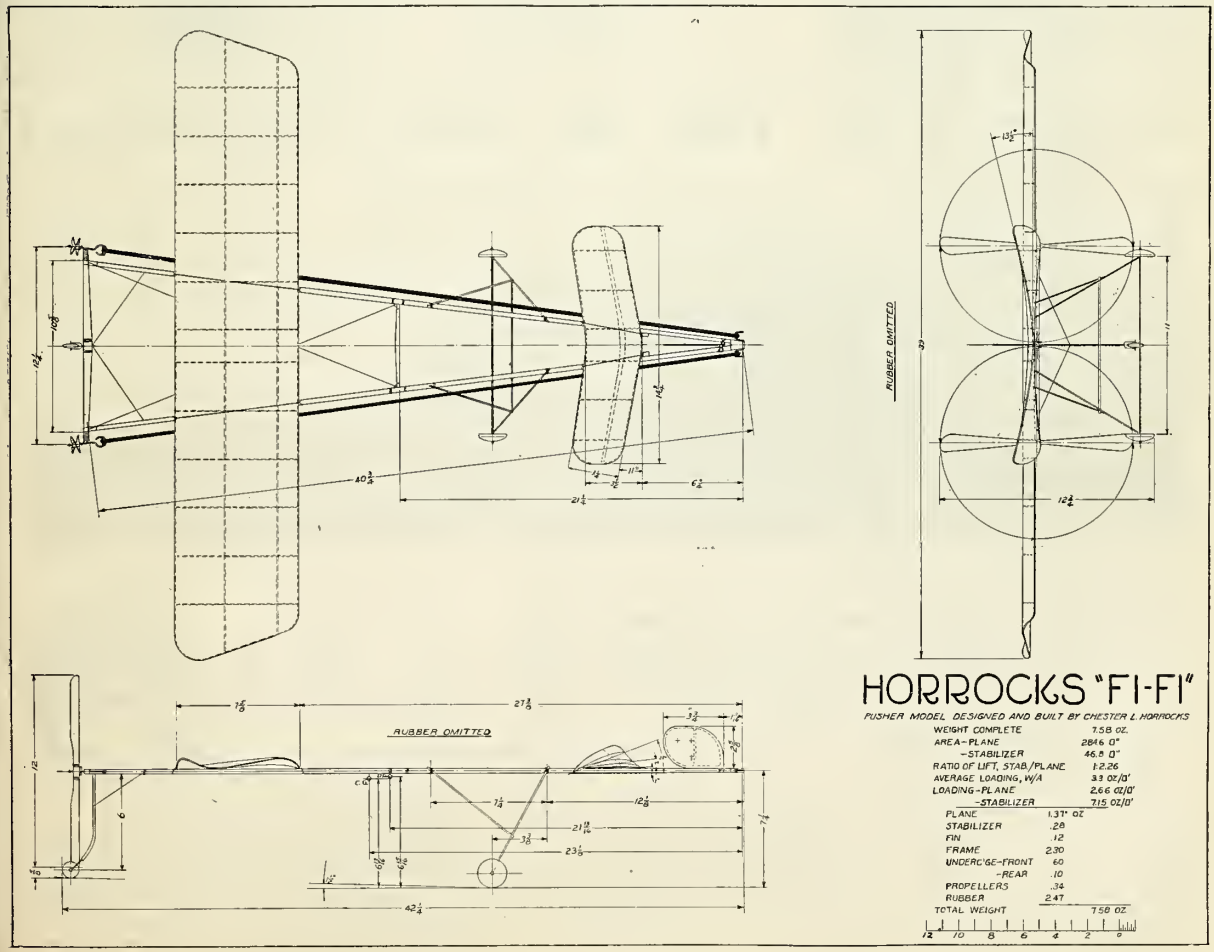
The stabilizer is supported on an adjustable mounting composed of two bamboo strips $\frac{1}{8}$ inch by $\frac{1}{32}$ inch curved to the shape of the undersurface and supported foi ward by two $\frac{3}{16}$ inch by $\frac{1}{32}$ inch by $1\frac{1}{4}$ inch notched posts, which are lashed to them. The rear ends of the strips, as well as the posts, are lashed to the frame with rubber strands, and the notches in the posts allow the mounting system to be lifted or depressed as required for elevation correction. The stabilizer is held in place by two strands with a loop on the front end which slips over the ends of the strips.

Fin

The matter of fin surface for this model will be discussed later, for it is extremely interesting. Here, however, the original arrangement of the fin will be described because it is one of the very interesting details of construction.

Only those who have experienced the wayward, uncontrollable "kinkling" of a paper or fabric-covered fin constructed of bamboo, wire, balsa wood, rattan or any of the usual materials, will appreciate Horrocks' fin construction, which is both light and simple.

The frame or skeleton is cut out of sheet



aluminum (.032), as indicated on the drawing, and the rice paper is applied to both sides and doped. The covering sticks together, but this "laminated" paper has marvelous strength. Two lugs are provided on the bottom of the fin near its front edge for attachment to the frame by rubber strands. When complete, a fin of this type may be bent, straightened and rebent at will. It is strong, relatively light and durable, and offers a minimum of resistance to the air.

Landing Gear

The main gear is constructed almost entirely of bamboo and is consequently capable of taking violent landing shocks. The front or main struts are $\frac{3}{32}$ by $\frac{5}{32}$ by 9 inches long, while the brace running from the frame down to these struts is $\frac{3}{32}$ by $\frac{3}{16}$ by 7 inches long. The cross member is $\frac{1}{8}$ by $\frac{1}{16}$ by 8 inches long, and the axle stiffener is $\frac{1}{16}$ by $\frac{5}{32}$ by $10\frac{3}{4}$ inches long. All pieces are of streamline section and are mounted so that they are "edge-on" into the flow of air as the model flies. A single piece ($\frac{1}{16}$ inch diameter) steel wire axle is used and the wheels are $\frac{3}{8}$ inches thick by 2 inches in diameter balsa wood, covered with doped-on paper to prevent splitting. Tubular brass hubs are provided in the wheels as bearings. These are cemented in place.

The upper ends of the struts that attach to the frame terminate in a wire bent at the proper angle to fit into brass tube sockets lashed to the frame members. This facilitates easy removability of the undercarriage as a unit.

The rear wheel is 1 inch diameter celluloid and is mounted on a wire fork, the shank of which extends up to the rear cross member of the frame where it is bent at 90 degrees to fit into a brass tube socket. A 1/6 inch by $\frac{1}{8}$ inch piece of streamlined bamboo is lashed at intervals to this wire for the purpose of stiffening. Two wire guys run forward to brace the wheel post.

Propellers

The propellers are rather conventional. The white pine or bass-wood blanks from which they are carved are of the following dimensions: Length 12 inches; width 1 inch at tip, $\frac{3}{16}$ inch at hub; and thickness $\frac{7}{16}$ inch at tip, $\frac{3}{8}$ inch at hub. The blades are carved relatively thin and are given considerable camber or curvature. A short piece of $\frac{1}{8}$ inch O.D. by $\frac{1}{16}$ inch I.D. brass tubing is fitted in the hub to act as a bearing when swiveling. A rather ingenious sheet metal swivel is provided. Although the blades of these propellers may seem rather narrow for such a heavy model, they seem to drive it without any difficulty.

Powerplant

Fourteen strands of $\frac{1}{8}$ inch flat rubber make up the skein for each propeller. For an average flight approximately 700 turns are given to each skein. A lubrication of glycerine is used, and the end hooks are covered with rubber tubing to protect the strands from being cut.

Performance

The model has flown quite satisfactorily with the original fin arrangement, as shown in the drawing. Mr. Horrocks, however, permitted me to experiment with a fin designed in accordance with the formula Span plus Length times .03 equals distance from C.G. to D.C. The photograph shows what happened to the fin. It will be noted that it moved back to a position over the main plane. Under this condition the model flights were greatly improved in both directional stability and general stability.

Although it cannot be said that this model has anything of a sensational performance, still it is a thoroughly practical, every-day model, capable of good R.O.G. flights of distances ranging around the 1,000-foot mark. Because of its ability to cut steeply banked circles of about 75 or 100 feet in diameter, it has been singularly successful as an indoor flier in spite of its weight and large size. It will stand much rough usage, and is rugged enough in construction to fly in almost any weather. Here's wishing lots of luck to those who build it.

Don't Forget These Points

1. Can you name five advantages of the A frame twin pusher?
2. How can you approximate the thrust required to fly a model after knowing its weight and gliding angle?
3. Can you explain "Yaw"? And how does the A frame fight it?
4. How can you approximate the propeller thrust lost in the A frame type?
5. What is "Wash out"?

FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ENGLAND

EXPERIMENTS in fog flying were recently conducted at Farnborough by a pilot of the Doyal Air Force flying a standard Avro plane and carrying a member of the Air Ministry Scientific Research staff. Five successful landings were made in a fog which extended to a height of ninety feet above the ground. The apparatus used consisted of a tethered sighting balloon 400 feet high and about one-half mile from the field; a pitch and yaw indicator and a weight suspended by a wire a few feet below the landing carriage of the ship. The airplane took off in the fog and flew above it. The height of the balloon being known, the ship glided by it at an angle indicated by the instruments. When the suspended weight touched the ground, a red light installed on the instrument board was illuminated.

A RECIPROCAL agreement between Great Britain and Germany whereby an aircraft or aircraft engine manufactured in either country and for which an airworthiness certificate has been issued will be admitted for private use without further tests in the other country has been effected.

THE Blackpool Corporation has provided a municipal aerodrome at Stanley Park and is fostering the Blackpool Flying Club. A committee has been organized and the enrollment of members is making rapid progress. A clubhouse is being built at a cost of approximately $40,000.

The management of the aerodrome and the flying organization of the club will be undertaken by National Flying Services, Ltd., recently granted a seven years' lease of the aerodrome by the corporation. The Blackpool Flying Club is the sixth to enter the National Flying Services group.

A Desoutter air taxi and a Cirrus Moth training plane have been stationed at the aerodrome, and Captain F. C. Crossley has been appointed chief instructor and pilot-in-charge of the aerodrome. More machines and a second instructor will be added as soon as they are required to meet the demands of members.

FRANCE

THE first time that customs statistics showed airplane imports into France was in 1929, according to a report of French civilian aeronautical activities during that period recently made public. These imports totaled approximately $140,000 and represented aeronautical equipment in general. Exports of aeronautical equipment totaled approximately $8,577,230 in 1929. The principal markets were Yugoslavia, Belgium, Turkey, Rumania, Soviet Russia, and Brazil.

Planes operated in commercial air transport service flew a total distance of 5,661,000 miles, and carried 25,256 passengers for 7,477,000 passenger miles. These planes carried a total of 3,531,700 pounds of express for 533,000 ton miles, and 328,675 pounds of mail for 188,000 ton miles.

Although private flying has not been developed to any great extent in France, there has recently been an increase in interest toward this phase of aviation, and flying clubs, commercial firms and private individuals are becoming interested in the purchase of equipment. There are fourteen private flying schools. The cost of training necessary to obtain a pilot's license is about $1,600, exclusive of board and lodging.

THE sum of $7,840,000 has been appropriated by the French Government for commercial air transport lines during the fiscal year ending March 31, 1931. This sum is included in the air budget which totals $80,500,000.

The budget includes, in addition to this grant to the airlines, subsidies for the general development of the aeronautical industry, $145,000; research, $4,002,000; material for schools, $6,172, and buildings and installations, $6,665,000.

ITALY

STIMULATED by the assistance of the government, there has been a rapid development of civil aviation in Italy during the past few years. A few years ago, practically all of the aircraft used commercially were imported. At the present time, however, Italy not only produces its own aircraft requirements on a scale that is constantly increasing, but has developed an export trade in aircraft.

The government has adopted the policy of granting cash subsidies generally based on the number of kilometers flown. In addition, the government gives assistance to commercial aviation, including the granting of the free use of flying fields, hangar space and meteorological services; reducing taxes on air transport companies to a minimum, and allowing the free importation of approved types of foreign commercial aircraft, engines and accessories, fuel and oil to be used by companies operating air transport services. Contracts are granted for the transportation of a determined amount of air mail for each flight at a fixed figure per kilogram. Mail in addition to this weight and up to a maximum weight is paid for at a higher rate per kilogram.

Imports of aircraft for the years 1924-28 and the first eleven months of 1929 were as follows: 1924, landplanes 4, seaplanes, —; 1925, 6, 3; 1926, 4, 2; 1927, 15, —; 1928, 6, —; 1929, 11, 5. Imports of aircraft parts during this period were as follows: 1924, landplane parts—metric tons, seaplane parts 6 metric tons; 1925, 12, 26; 1926, 84, 7; 1927, 66, 4; 1928, 65, —; 1929, 92, 4.

The exports of aircraft during this period were as follows: 1924, landplanes 58, seaplanes 21; 1925, 82, 32; 1926, 15, 13; 1927, 4, 14; 1928, 12, 41; 1929, 22, 22. The exports of aircraft parts during the period 1924-29 were as follows: 1924, landplane parts — metric tons, seaplane parts — metric tons; 1925, 65, 13; 1926, 6, 43; 1927, 10, 40; 1928, 21, 50; 1929, 17, 16.

In 1924 the total exports of aircraft and aircraft parts totaled approximately $367,279 as compared with a total of $2,156,905 in 1928. There was a decrease for the first eleven months of 1929.

GERMANY

[EDWIN P. A. HEINZE]

THE Luft Hansa has opened new night routes extending from Hanover over Cologne to London; from Hanover over Cologne to Paris; and from Berlin to Halle-Leipzig. About twenty-five per cent of the short routes operated last year and having a length of under 180 miles have been dropped. In addition, ten per cent of the medium length lines under 450 miles have been eliminated. The longer routes have been increased twenty per cent, last year's experience having shown that these lines pay best.

Activities of the German Air Union

THE twenty-fourth annual meeting of the German Air Union (Deutscher Luftfahrt Verband) was held at Kassel, Germany, during the latter part of June, 300 delegates from all parts of the country attending. The reports submitted at the meeting show that the number of members has increased from 35,300 to 44,800. The union now owns sixty-four airplanes as compared with fifty-five last year, and the average flying time of these planes, including the new ones, has increased from fifty hours to eighty hours. Light planes, the initial cost of which is approximately $3,000, are used. As a result of the increased use made of these ships, the cost per flying hour has dropped from approximately $32 to $19. In 1929 the union's planes covered 310,000 miles and in 1928, 165,000 miles. A total of 28,036 flights was made in 4,858 hours of flying in 1929, as compared with 12,584 flights in 2,646 hours in 1928.

The union maintains its own flying schools, which are supervised by the Deutsche Luftfahrt G.m.b.H. To augment their work a delegate at last year's meeting proposed that certain clubs, which are suitable for the purpose, should be given permission to train flying students. This proposal was eventually adopted in a modified form. Several clubs were given the requisite authority and their work has been such a success that additional clubs plan to

give instruction. Three clubs, one of which is located at Mannheim, one at Köthen and one at Cologne, trained a combined total of eighty-three students last year. The instructors in these clubs receive no compensation.

The German Minister of Transport last year gave several clubs permission to transport passengers against payment, and Herr Brandenburg, director of the aviation department of the transport ministry, present at the meeting, said on behalf of the minister, that this was a branch of activity of the clubs open to further development since it was a policy of the minister to support the long-distance lines of the Luft Hansa, leaving ample room for local organization to meet whatever demand for short lines there may be.

IN celebration of the evacuation of the Rhineland by French troops the German Air Union organized an airplane rally at Cologne, held in conjunction with its third national light plane reliability trial. More than eighty machines took part in the rally, which was a great success. Also the reliability trial was an outstanding success and had several interesting features. Only members of the union could take part with their own machines or those owned by one of the affiliated clubs. The competitors had to cover within three days a distance equal to fifteen times the cruising speed of their craft. They were permitted to select their own routes. Before the race they had to send in a map marking the route they intended taking as well as the length of the daily trips.

CANADA

THE Second Annual Canadian Air Pageant, sponsored by the Montreal Light Aeroplane Club, is scheduled to be held at St. Hubert Air Harbour, September 6-7. Events will include an air meet in which cash prizes will be awarded winners of the various contests, and an exhibition of aircraft and accessories.

[J. MONTAGNES]

GEORGE MICKLEBOROUGH and Major Geoff S. O'Brian of Toronto flew the distance of 1,400 miles between Toronto and Winnipeg recently between dawn and dusk. Leaving Toronto at 4:20 a.m., they reached Winnipeg at 10:10 p.m., flying one of the new DeHavilland Puss Moths. Deducting the time taken for five refueling stops en route at Detroit, Chicago, Fargo and Grand Forks, their actual flying time was fourteen hours. The plane consumed eighty gallons of gasoline and two gallons of oil on the trip at a net cost of $28.

THE Junkers Aircraft Corporation of Dessau, Germany, anticipates assembling certain of its various types in the Dominion, according to recent reports. One of the company's representatives is in Montreal to investigate the situation, and will use one of the Junkers monoplanes for demonstration purposes. It is expected that he will remain several months to discuss conditions and prospects with leaders in aviation.

OVER 20,000 people witnessed Moose Jaw's first annual flying meet held recently. More than thirty planes from points in Western Canada and the Northern United States participated in the events.

CANADIAN aviation authorities at Ottawa have approved the site recommended for the Winnipeg Municipal Airport, development of which will cost about $500,-000.

MEXICO

[M. HURST]

AN aerial survey of the entire republic of Mexico will be made in the near future. The government has acquired apparatus to be used on planes for the photographing of roads, rivers and the general topography of the country. The first photographs will probably be made in the region between Laredo and Mexico City on the air route which links those two cities.

LANDING fields for the use of the army air force and commercial aviation interests will be established throughout the republic. They will be built by the soldiers garrisoned in the various states.

A NEW flying field has been completed and operations inaugurated at Chapala. The field is situated on the lake of the same name and is a favorite resort for residents of the city and of the national capital.

ORDERS have been placed with the national airplane factory at Mexico City for a two-passenger airplane for the state government at Yucatan. The plane, to be powered with a Wright Whirlwind engine, will be delivered in September.

FOUNDATION work has started on the concrete and stucco passenger and express depot building of the Compania Mexicana de Aviacion at Rihl Field. The work on the new structure began immediately upon completion of the gasoline building, another concrete structure. Of Colonial style architecture, to be finished in stucco with a gaily colored roof, the new depot building will be decidedly attractive, according to plans prepared by Ing. Michel, who is in charge of the construction. Square spaces about the gasoline tanks are being paved to allow the trimotor planes to taxi around for fueling. Ample space will be provided so that two of the large planes may refuel at the same time. Runways were finished some time ago. The building program calls for the construction of new concrete hangars at some later date.

A STUDY is being made by the aeronautical section of the Department of Communications of means of developing aviation in Mexico. The department will study the organization of flying schools and the licensing of pilots and airplanes. All pilots who seek licenses must produce proof that they have flown 1,000 hours.

THE Club Aereo Tamaulipas of Tampico has completed the construction of a glider eighteen feet in length and with a wing span of thirty-two feet. This club was organized last November primarily for sport, but if demands justify it, the sporting club will operate a glider factory.

PERU

[H. GOMEZ-CORNEJO]

COMMANDER Fernando Melgar is chief director and commander of the Military Air Base and School of Las Palmas. Commander Melgar is a regular infantry army officer of the Peruvian Military School of Chorrillos. He was transferred from the army to succeed Lieut.-Colonel Juan O'Connor, Peruvian military aviator who learned to fly at the Argentine Military Air School of El Palomar in 1911. Lieut.-Colonel O'Connor was sent over to Europe on a special government mission.

Commander Melgar, not being a flier, learned to fly at the air base in 1929, when he succeeded Lieut.-Colonel O'Connor. He has effected many improvements since his appointment.

BRAZIL

FORTY-THREE civil airplanes are in use in Brazil, according to the most recent statistics available. Of this number, three are American; seven, British; two, Italian; twelve, French; and nineteen, German, fifteen of which are used in regular scheduled operations. In addition to these forty-three planes, there are fifty-one French planes and eight American planes employed in international services through Brazil.

Seaplanes and amphibions are in greatest demand due to the fact that practically all commercial flights are made along the coast rather than in the interior. Conditions in the vicinity of Rio de Janeiro are said to be ideal for the operation of such craft.

There are no restrictions or special regulation affecting the importation of airplanes into Brazil. It is not necessary to obtain any special permits for bringing aircraft into the country.

URUGUAY

THE First Pan-American Aeronautical Congress is scheduled to be held at Montevideo, February 1-20, 1931, as part of the International Aeronautical Salon and Exposition. The congress will discuss international air navigation from the standpoint of all the American countries. The subjects proposed for discussion include the following: Airports, signals and letters of identification for the safety of pilots; customs and fiscal questions relating to air navigation; aeronautical charts; collection and diffusion of aerological observations; collection and publication of statistics on air navigation in American countries; rules regarding the circulation of aircraft in American countries; and high tribunal conjointly to decide juridicial questions of American aeronautics.

DEUTSCHE LUFT HANSA IN 1929

[By EDWIN P. A. HEINZE]

THE Deutsche Luft Hansa recently presented its report for the year ending December 31, 1929. The report shows that in spite of financial difficulties arising from the unexpected reduction of the government subsidy, the company was able to carry through effectively the major part of its reorganization work. This was accomplished during the main flying season with results which, under the given circumstances, must be regarded as exceedingly satisfactory.

At the beginning of 1929, the company's fleet of planes consisted of 148 ships, including multi-engined transports, medium and small-sized planes. The number of multi-engined ships amounted to thirty-five. By the end of the year the total number of ships had increased to 159, of which forty-two were of the large class. Twelve of the ships were equipped to operate on the water. In all, sixteen large, four medium and three small planes were newly acquired. The company spent 3,400,000 marks ($800,000) for these acquisitions from the German aircraft industry.

Indirectly this industry was employed for the Luft Hansa by purchases made by the Transport Ministry, the goods then being passed on to the Luft Hansa within the limits of the material subsidy agreement which was quite apart from the ordinary subsidy. The company terminated this subsidy agreement at the end of April 1929, when it was given a free hand to make its own purchases. The material supply account was balanced, and the Luft Hansa took over from the ministry material valued at 6,166,170 marks ($1,470,000). The company stands to receive a balance in cash amounting to 3,900,000 marks ($930,000), which will be paid in two instalments in 1933 and 1934. Although the regular subsidy was cut down virtually fifty per cent, the government granted a compensation of 6,000,000 marks ($1,430,000) to the Luft Hansa, because the company, not having been able to foresee the cut of the subsidy at so late a date in the year, had incurred liabilities to the extent of 6,665,000 marks ($1,590,000) for the extension of its 1929 services. This investment was now a heavy drag on the company's finances, and the government came to the rescue with the above grant, which will be paid in instalments of 2,000,000 marks ($478,000) in 1930, 1931 and 1932. This grant enabled the company to make adequate deductions in the 1929 balance sheet for depreciation of flying stock.

The loan of 6,000,000 marks ($1,430,000), which, according to the 1928 report, the Luft Hansa was to have received for the operation of airlines beyond the boundaries of Europe, was not taken up. Instead, the company was given a government grant of 3,000,000 marks ($715,000).

The Luft Hansa had an income in 1929 of 30,311,076 marks ($7.210,000), which is made up as follows (the figures representing dollars are approximate):

Income Source	Marks	Dollars
Fares, Freights, Subsidies....	23,862,786*	$5,676,000
Sales of Materials............	1,188,289	284,000
Government Compensation.....	6,000,000	
Minus Interest	740,000	
	5,260,000	1,250,000
Total	30,311,075	$7,210,000

*5,500,000 marks were contributed by federal states and communities.

The assets of the company totaled 30,605,821 marks ($7,450,000). The liabilities, to which in Germany is always counted the share capital amounting in this case to 25,000,000 marks ($6,000,000), totaled 30,591,777 marks; i.e., 14,044 marks ($3,350) less than the assets. High deductions for depreciation of stock have been made. The airplanes and engines have been written off on the average at the rate of more than thirty per cent. In view of the longevity of the numerous all-metal planes the Luft Hansa owns (one still in service is ten years old), this rate is high and should help to create ample latent reserves. A twenty-five per cent rate of depreciation has been adopted in the case of tools and workshop equipment, and a fifty per cent rate for automotive equipment. Even office furniture has been written off to the extent of thirty-three per cent. The airplane, which before the deduction was valued at 10,380,000 marks now is put down in the balance sheet at 7,158,000 marks ($2,400,000 and $1,700,000 respectively). A total of 532 engines has been reduced in value from 7,389,000 marks ($1,760,000) to 5,124,000 marks ($1,220,000).

The following service figures are given in the report, being slightly different from those published some months back. The converted mileages and weights are approximate.

	1929	1928
Schedulde service.....	5,600,000 miles	6,200,000 miles
Other paid flights.....	226,000 miles	339,000 miles
Total..............	5,826,000 miles	6,539,000 miles

It will be noticed that there has been a decrease in the 1929 mileage compared with the 1928 mileage of 10.14 per cent. The 31.32 per cent decrease in the mileage of the extra services is not of importance as the figures are relatively small. The total decrease of the mileage of paid flights is 11.20 per cent.

PAYLOADS IN SCHEDULED SERVICE

	1929	1928
No. of passengers..	87,019	111,115
Luggage	1,520,000 pounds	1,910,000 pounds
Freight	2,240,000 pounds	2,210,000 pounds
Mail	802,500 pounds	700,000 pounds

The number of passengers decreased by 21.07 per cent and the number of pounds of luggage by 20.05 per cent. The freight carried increased 17.2 per cent, and the mail, 15.5 per cent.

The reorganization of the company's services is not yet complete in all details. The standardization of the fleet will take some years to accomplish. The tendency is to confine the models employed in the service to one or two of the best obtainable for each class of work in order to facilitate maintenance and service extension. Thus, the company is striving to fix eventually on one standard type large machine, one medium and one small.

The elimination of the superfluous staff has been completed. In June, 1928, the company had 2,961 employees. A year later there remained 2,005 and by the end of 1929 there were 1,815. The winter months were again utilized for training pilots in blind flying. The all-risks self-insurance scheme inaugurated May 1, 1929, has so far proved exceedingly successful.

The reorganization of the flying service schedule has been conducted with the object of eliminating all lines that do not pay adequate dividends. The first factor considered when deciding upon the establishment of a new line or the maintenance of an old one, is the number of passengers using the line or likely to use it. The relationship between flying and railway time is investigated in addition to the length of the route. An airline must at least bring in a saving in traveling time over and against the railway of forty-five per cent The minimum distance for a non-stop line has been fixed at fifty-five miles, and for a line with intermediate stops, 110 miles. The hop lines are being dropped entirely. They are being served by small local companies and by the Nordbayerische Verkehrsflug A. G., which coöperates with the Luft Hansa. The Nordbayerische is not supported in any way by subsidies of the National Government, but receives such subsidies from some federal states and the municipalities which it serves. The Luft Hansa retains the long routes and international stretches. Being, however, to the extent of about 5,500,000 marks ($1,300,000) also subsidized by the federal states and certain larger municipalities it, of course, cannot to the last consequence carry through its aim of only maintaining lines that altogether fulfill the demands set in regard to economy. Also some sacrifice must be made in the development of flying in certain parts of the country with an eye to the future.

The outlook for the present year is decidedly better than for the past. The National Government, in view of the grave situation of the industry and the huge number of unemployed in Germany (all told about three million), is making an effort to obtain a larger sum for the support of aviation from the Reichstag than the previous year. The Luft Hansa hopes to obtain this year a total of 19,000,000 marks ($4,500,000), about fifty per cent more than the company was allowed last year. Of this sum, 16,000,000 marks ($3,800,000) are meant for the support of the lines operating in Europe; and 3,000,000 marks ($700,000) for the development of flying services beyond Europe.

AVIATION IN THE SOUTHWEST

(*Continued from page* 54)

operates eight planes, including two trimotored Fords, a Buhl cabin plane, two Lockheeds, a Great Lakes Sport plane, Captain Hawks' new Travel Air Mystery S, and a Waco two-place sport biplane.

Capt. Frank Hawks is head of the aviation sales department, but devotes a large part of his time to actual flying.

The Texas Company, which has been producing aviation products since 1914, recently added Diesel aviation oil to its line of aviation gasoline, lubricating oils, rocker arm lubricants and fine parts oil.

The Skelly Oil Company is one of the up-and-coming oil companies of the Southwest. It is manufacturing special aviation products known as Skelly Aerodynamic Gasoline, Skelly Airplane Oil, Skelly Rocker Arm Lubricant, and Skelly Magneto Oil. The company has resources of more than $100,000,000. Its aviation gasoline is manufactured directly at natural gasoline plants throughout Texas and Oklahoma rather than at refineries. Special equipment for this purpose cost over $2,000,000. (A complete description of the process by which Skelly manufactures aviation gasoline was published in AERO DIGEST for May, 1930.—Editor.)

Skelly provides service at many airports and sells directly to various air transport companies. S.A.F.E., one of its better known customers, buys in carload lots.

Although no airports are owned or operated, Skelly controls the Spartan Aircraft Company, which operates the Spartan School of Aeronautics.

The aviation sales department owns two Spartan C-3 three-place open-cockpit biplanes used by pilot-salesmen, and a Spartan four-place cabin plane for company officials. Most flying activities are concerned in selling of the Skelly aviation products rather than for advertising purposes. Operations are concentrated in the Southwest and Middle West.

Recently, Skelly has been quite active in fighting state gasoline taxes imposed on interstate airline operators.

The Empire Oil & Refining Company is a subsidiary of the Cities Service Company, operating in the Southwest.

The company is now producing aviation gasoline and oils after three years of research work. It operates a 300-acre commercial airport at Bartlesville, Oklahoma, which city is the company headquarters. At the present time, it operates a four-place Boeing cabin plane, powered with a 525-horsepower Wasp engine. The aviation personnel is headed by a manager of aviation, who directs all laboratory activity, petroleum engineers and a pilot and mechanic.

Since the company has only recently begun to market special petroleum products for aviation purposes, most of its flying heretofore has largely been confined to research and development of its aviation products. Plans are being made to develop an aviation sales department as soon as possible.

The Phillips Petroleum Company, of Bartlesville, Oklahoma, has experienced a rapid growth in its sales of aviation products. It has recently equipped several of its planes with apparatus for testing gasoline under flight conditions. This experimental work is being done in coöperation with the National Gasoline Association of America.

Phillips is now supplying gasoline and oils to fourteen airport bases of the Universal Aviation Corporation in the Middle West and Southwest. The company operates several Travel Air planes.

Although the Union Oil Company of California concentrates most of its activities in that state, it also operates in Northern Mexico and Arizona.

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The Texas-Pacific Coal & Oil Company has for some years been producing its brands of aviation products, marketed under the names of T-P Aero Motor Lubricating Oil, T-P Aero Valve Spring Lubricant, T-P Aero Rocker Arm Lubricant. These products are manufactured in Texas from paraffin base petroleum. Only recently has the company undertaken national distribution after sponsoring several flights in which its products were put to the test.

Shell Petroleum Corporation is a comparative newcomer in the field of aviation petroleum products, just as it is in the distributing field of other petroleum products in the United States. The company is operating several planes (including a Travel Air Mystery S) for the traveling activities of its officials, and its aviation gasoline and oils are continually becoming better known at most airports. As in other fields, it will no doubt give severe competition in several years to distributors now established. Lieut. James Doolittle, famous ex-Army pilot, joined Shell as head of its aviation division upon his resignation from the service.

Airplane Manufacturers

Although prominent in air transportation, the Southwest today has few manufacturers of aircraft. Leaders here are confident, however, that some of the airplane manufacturers now established in the East and Middle West will eventually realize the advantages of locating plants in the Southwest for the production of planes.

The Spartan Aircraft Company was organized by the same individuals who back Skelly Oil Company. The company has 40,000 square feet of floor space in its manufacturing plant, which occupies thirty acres. In addition, it has hangars and offices at Tulsa Municipal Airport, and an auxiliary airport several miles out of the city.

Four types of planes are produced—C-3-165, a three-place open land biplane powered with a Wright Whirlwind 165-horsepower engine; the C-3-166, a three-place biplane with a Comet 165-horsepower motor, the C-3-225, three-place open-cockpit land plane equipped with a Wright 225-horsepower engine, and the C-4-225, a four-place cabin monoplane fitted with a Whirlwind 225. These models are standard types, but the company also builds planes to specifications.

An interesting advertising campaign which employs the best publications in the field of aviation, business and sport, as well as magazines of national circulation, is now in progress.

Although Spartan planes have for some time been favorites among oil field operators, they are rapidly becoming popular on a national scale.

The Star Aircraft Company produces a ship which is making Bartlesville, Oklahoma, better known in aviation circles. Its Cavalier two-place cabin plane, which is adapted for private flying, was designed by Billy Parker, vice president and general manager, and E. A. Riggs. The company is four years old.

The Cavalier, equipped with either a Lambert sixty-five-horsepower radial air-cooled engine or a LeBlond engine, has a top speed of 105 miles per hour and carries a useful load of 540 pounds. Equipped with a Lambert ninety-horsepower engine, the Cavalier has a top speed of 120 miles per hour with a useful load of 530 pounds.

The Star company is backed by the same individuals who are interested in the Phillips Petroleum Company. Billy Parker is associated in a dual capacity as general manager of the Star company and as chief aviation fuel engineer and test pilot for Phillips Petroleum Company.

Russell Airways, Inc., of Okmulgee, has developed a monoplane which incorporates several new principles of airplane construction. This plane has not yet been put on a production basis.

Engine Manufacturers

Known engine manufacturers in the Southwest are as follows:

The Hurricane Motor Company, Inc., of Houston, Texas, is doing experimental work on an aircraft engine.

Tips & Smith, Inc., has for some time been engaged in converting rotary motors in addition to its other activities. The company is located at Houston, Texas.

Airport Designers and Builders

The airport construction division of Southern Air Transport builds, designs and advises on airports.

The Beretta-Steles Company, Inc., of San Antonio, is a firm of architects who have designed several successful airport projects.

The Austin Company, of Dallas, Texas, builds and designs airports, and has the resources and experience of a national organization which has built some of the nation's best-known airports.

Supply Houses

Although supplies and parts for airplanes are available in most cities of larger size, or from most aircraft manufacturers and airport operators, the following supply houses in the Southwest make a business of this phase of aviation:

Mission Airplane Service of San Antonio, Texas, handles supplies and also operates a flying school.

San Antonio Aviation and Motor School of San Antonio operates as a jobber in addition to school activities.

J. L. Schroeder & Company of Houston is an established jobbing and supply house.

Southern Airways, Inc., of San Antonio, which recently took over the school activities of Southern Air Transport at San Antonio, has been handling aviation supplies for some years.

Aerial Advertising

A company doing aerial advertising in the Southwest is Houston Airways, Inc., which also operates a school and does aerial survey work.

Aerial Surveying

The Edgar Tobin Aerial Surveys of San Antonio has done considerable aerial survey work for various oil companies.

Houston Airways, Inc., also includes this phase of aviation in its activities.

Southern Air Transport recently organized a subsidiary to do aerial photography and surveying.

Crop Dusting

Crop dusting, or the chemical treatment of the cotton plant with calcium arsenate through spray guns attached to planes which fly low over the plantation, has become a widely used preventative measure of vital importance to the cultivation of one of the South's main staple products. This method permits of a wide and more thorough treatment for combating the boll weevil than has heretofore been employed in the cotton belt.

Quick Aeroplane Dusters of Houston, Texas, and International Flying Service, located at Love Field, Dallas, are

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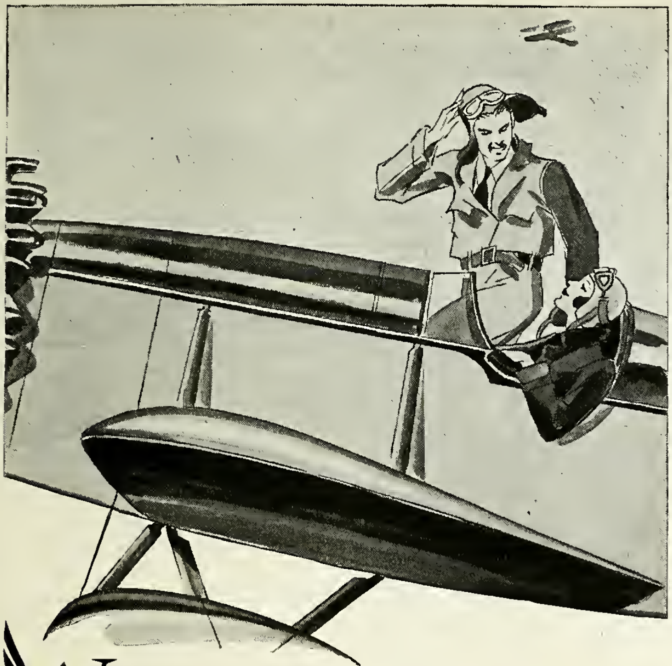


WINGS for you

Get Into the Wide Open Spaces Where No Limits Are Placed on Either Speed or Opportunity

Aviation is the fastest moving industry in this swift moving age. It is a young man's game and a young man's opportunity. This is the chance of a life time for fellows with ambition and determination to succeed, to enter a brand new business and grow with it to financial success and power. Without a doubt, aviation is just beginning its biggest development. It is high time for you to make a start in what is destined to become one of the world's most important industries.

Universal Aviation Schools will train you in any branch of aviation you wish to enter. If you wish to become a pilot, mechanic, welder, or enter the business end of aviation, this National System of Government Approved Aviation Schools has just the course you need and the highest type of equipment and personnel to train you. Send for a copy of the book, "Aviation—What It Means To You," which describes all that Universal Aviation Schools have to offer you and gives full information about training and tuition. Write for your copy of this free book today.

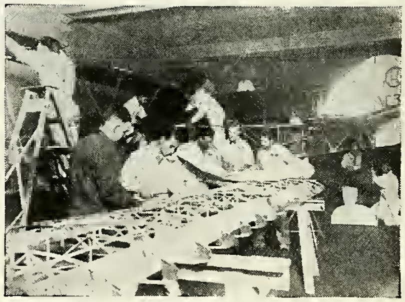
Universal Aviation Schools

DIVISION AMERICAN AIRWAYS, Inc.

Lambert-St. Louis Airport, U. S. A.

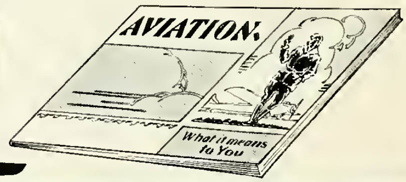
A National System of Government Approved Aviation Schools

A transport flight student preparing for a lesson in blind flying. The instructor covers the front cockpit in which the student sits, compelling the student to fly the plane with no other assistance than that furnished by his instruments. The instructor in the open cockpit in the rear keeps a check on the plane's flight and shows the student how to correct his faults.



Airplane maintenance, construction and repair are taught in a thoroughly practical manner by seasoned instructors to Universal students taking flight or mechanical courses.

Sent Free This interesting book about Aviation beautifully illustrated. Contains a wealth of information. Sent free to men interested in entering aviation. Clip the coupon below and mail.



MAIL this Coupon

UNIVERSAL Aviation Schools
Division American Airways, Inc.
Box S-104, Lambert-St. Louis Field, Robertson, Mo.

Please send me, without obligation, a copy of "Aviation—What It Means to You," and advise me what training I need to become

☐Pilot ☐Mechanic ☐Welder ☐Office Executive

Name ________________ *Age* ________

Address ________________ *Phone No.* ________

City ________________ *State or province* ________

My past experience other than aviation is ________________

____

PLEASE PRINT CLEARLY

UNIVERSAL AVIATION SCHOOLS

(*Continued from preceding page*)

making a specialty of crop dusting.

Aeronautical Insurance Underwriters

The Southwest Insurance Agency, division of Southern Air Transport, was originally organized to underwrite insurance on that company's planes, but is now also offering this protection to others.

The following are insurance brokers:

Brants Company, Fort Worth, Texas; Coleman & Company, San Antonio, Texas, and B. A. Killson, Houston, Texas.

In the preceding columns an effort has been made to show the rapid development of Southwestern aviation. For a sparsely settled area in a young country, a record, I believe, has been set. By comparison, other parts of the country suffer. The Southwest, I believe, will remain in the foreground of progress. At least it will bear watching closely.

AERONAUTICAL EDUCATION

(*Continued from page 45*)

two to three years in those subjects which are common to all engineering and which are already provided for in the civil, electrical or mechanical courses. In the next year or so the student could cover such aeronautical subjects as may be useful to him regardless of what branch of aeronautical engineering he may elect to follow or by force of circumstances drift into. The last year—or portion of a year, as may prove best—could be devoted to some of the more highly specialized aviation subjects, such as maintenance practices, production methods, economics of air transport, marketing methods, airports and airways, etc. New York University has already made a start in this direction by offering an "air transport" option.

As mentioned previously, I recently had occasion to map out a series of subjects intended to represent an aeronautical option for the mechanical or other engineering student in one of the Eastern colleges. The list which was the outcome of this is given herewith, planned (as requested) for thirty periods of two hours each. This total, however, seems inadequate even when the series is to be merely an option. It was therefore suggested that sixty sessions would serve the purpose much better if this number could be made to fit in with the balance of the courses of which it was to form a part. Although admittedly there are shortcomings in attempting to cover several aeronautical phases in such brief time, it is interesting to note that nearly fifty per cent of the proposed sessions cover subjects which are completely ignored in the curricula of many of our best aeronautical colleges. Since no one can deny the importance of any of them, it seems evident that *something* is wrong with our method of higher education in aeronautics.

Of all of the college curricula considered, that of the Daniel Guggenheim School of Aeronautics of New York University showed what seems the best effort to cover all phases rather than merely those applying to aircraft design. For example, we find there such subjects as: Economics of Air Transportation, Aviation Accounting, Statistics, Engineering and Commercial Law, Business Organization, Aeronautical Meteorology—and the subject of Airports will be added shortly. That these subjects were placed in the course as part of a definite plan, is made clear by the following statement quoted from the catalogue:

"The general purpose of the courses in aeronautical engineering is to train engineers, rather than aerodynamicists, men who can take part in the practical work of designing, building and developing aircraft and aircraft engines on a scientific basis. Equally important with the technical development of the airplane is its utilization on a commercial basis. The courses in air transport are designed for students who may wish to follow careers in the application of aircraft in air transportation, aerial surveying, forest and crop protection and similar fields."

For the organization of this course Dean Bliss, Professor Klemin and other members of the faculty deserve credit for keeping up with the economic development of the industry.

These notes are set forth in a spirit of what is intended to be constructive criticism. It is fully appreciated that faculty members charged with the work of organizing such courses have a serious problem on their hands in attempting to cover adequately the subjects which are of most immediate and most general value to the average student and, at the same time, provide for the greatest variation from this average case. The college professor must also work under somewhat of a disadvantage in planning such courses, for the instruction of his classes does not bring him into daily contact with the technical needs of the industry.

Looking back over a good many years of extremely varied engineering experience, one develops some thoughts often at variance with those of our colleges as reflected in their curricula. Perhaps the uppermost of such ideas in my mind is the feeling that our colleges place too little emphasis on what might be called the "economic" phases of higher education. In this I should group such subjects as accounting, business law, costs, work and personnel organization, including office systems, public speaking, preparation of technical reports, engineering publicity, statistics and interpretation of business data, and last but by no means least, the subject of selling. No matter what work the graduate may take up after completing his schooling, he will find that sooner or later he will require some knowledge along these lines. Time for these subjects could be provided by some curtailment of the number of periods devoted to others which are less likely to prove of economic value to the student.

Subjects for "Aeronautical Option" for Mechanical, Civil or Electrical Engineering Course as Compiled by Mr. Black

1. History.
2. Elementary Aerodynamics and the Wind Tunnel.
3. Properties of wing sections, bodies, etc.
4. Stability.
5. Fundamentals of Airplane Design.
6. Aerodynamics, Theoretical and Experimental.
7. Aerodynamics of Airships and Balloons.
8. Airplane Structures.
9. Airplane Structures.
10. Airship Structures.
11. Materials of Construction.
12. Construction Practices.
13. Typical Airplanes.
14. Principles of Aircraft Engines.
15. Description of Aircraft Engines.
16. Hull and Float Design.
17. Aircraft Production.
18. Maintenance and Repair of Airplanes.
19. Maintenance and Repair of Engines.
20. Airship Maintenance.
21. Aircraft Instruments.
22. Airports and Airways.
23. Aircraft Radio.
24. Flight Training.
25. Air Transport Economics.
26. Air Transport Development.
27. Marketing Methods (including Advertising).
28. Accounting in Aircraft Manufacture and Operation.
29. Digest of Laws and Regulations.
30. Business Possibilities of Aeronautics.

Massachusetts Institute of Technology
Schedule of Aeronautical Engineering Subjects

First Year
(*First Term*)

Chemistry
Descriptive Geometry
English and History
Mathematics
Mechanical Drawing
Military Science
Physical Training
Physics

(*Second Term*)

Chemistry
Descriptive Geometry
English and History
Mathematics

(Continued from preceding page)

Military Science
Physical Training
Physics
Working Drawings

Second Year
(First Term)

English and History
Mathematics
Mechanical Engineering Drawing
Mechanism
Military Science
Physics
Language

(Second Term)

Applied Mechanics
English and History
Mathematics
Mechanical Engineering Drawing
Military Science
Physics
Language

Required During Summer

Forging
Foundry
Machine Tool Laboratory
Pattern Making
Rigging and Maintenance of Aircraft

Third Year
(First Term)

Applied Mechanics
Heat Engineering
Machine Drawing
Political Economy
Theoretical Aeronautics
General Study
Language

(Second Term)

Aerodynamics of Airplane Design
Heat Engineering
Materials of Engineering
Political Economy
Report Writing
Structures
Theoretical Aeronautics

Fourth Year
(First Term)

Airplane Design
Airplane Design Practice
Dynamics of Machines
Electrical Engineering Elements
Machine Design
Physical Chemistry
Testing Materials Laboratory
General Study

(Second Term)

Aeronautical Engineering Laboratory
Aeronautical Engines
Aeronautical Laboratory
Airplane Construction
Airplane Design Practice
Electrical Engineering Laboratory
Machine Design
Propellers and Airships
General Study
Thesis

University of Michigan

Schedule of Aeronautical Engineering Subjects

First Year
(First Term)

Modern Language
General Chemistry (or Metal Working, Theme Writing and Oral Exposition)
Algebra and Analytic Geometry
Mechanical Drawing
Physical Training or Military Science

(Second Term)

Modern Language
General Chemistry (or Metal Working, Theme Writing and Oral Exposition)
Plane and Solid Analytic Geometry
Descriptive Geometry
Physical Training or Military Science

Second Year
(First Term)

Modern Language
Calculus
Mechanics, Sound and Heat
Surveying
Mechanism and Sketching

(Second Term)

Modern Language
Calculus
Electricity and Light
Statics

Required During Summer

Machine Shop
Direct and Alternating Current Apparatus

Third Year
(First Term)

Strength of Materials
Elements of Machine Design
Dynamics
Heat Engines
Mechanical Engineering Laboratory
General Aeronautics

(Second Term)

Hydromechanics
Thermodynamics
Theory of Machine Design
Engineering Materials
Theory of Structures
Theory of Aviation

Fourth Year
(First Term)

Internal Combustion Engines
Theory of Design and Propellers
Airplane Design Lectures
Airplane Design Drawing

(Second Term)

English
Automotive Laboratory
Aerodynamic Laboratory
Design of Aero. Motors

ELECTIVES: (THREE REQUIRED IN EACH TERM OF FOURTH YEAR)

Lighter-than-air craft
Design of aerodromes and hangers
Advanced Stability
Advanced Design
Research
Mathematical Theory of airfoils
Air Transportation
Aircraft, Materials of Construction

New York University

Course of Study in Aeronautical Engineering and Air Transport

First Year
(First Term)

Mech. Drawing or Descriptive Geom.
General Chemistry
Experimental Chem. or Qualitative Analysis
Analytic Geometry or Trigonometry, Solid Geometry, Advanced Algebra
Rhetoric and Composition
Conference and Committee-Rm. Speaking
Military Science
Bookkeeping

(Second Term)

Mech. Drawing or Descriptive Geom.
General Chemistry
Qualitative Analysis
Advanced Algebra and Calculus or Analytic Geometry and Calculus
Rhetoric and Composition
Military Science
Conference and Committee-Rm. Speaking

Second Year
(First Term)

Calculus
Mechanics, Heat and Sound
Technical Writing
Statics
Military Science
Shop Equipment and Methods

(Second Term)

Calculus
Light, Magnetism and Electricity
Scientific Literature
Dynamics
Military Science
Machine Work and Forging, or
Surveying

Third Year
(First Term)

AERONAUTICAL OPTION

Principles of Economics
Direct-Current Machinery
Hydraulics
Mechanics of Materials
Thermodynamics

(Second Term)

Fundamentals of Airplane Theory & Design
Alternating-Current Machinery
Thermodynamics
Elasticity of Materials and Testing Lab.
Applied Kinematics and Theory of Machines

ELECTIVES

Industrial Psychology
American Government
Military Science
Oscillations
Light

Third Year
(First Term)

AIR-TRANSPORT OPTION

Principles of Economics
Cost Accounting
Thermodynamics
Mechanics of Materials and Testing Lab.
Direct-Current Machinery
Hydraulics

ELECTIVES

Industrial History
Introductory Psychology
Economic Geography
Military Science

(Second Term)

Cost Analysis
Elasticity of Materials
Alternating-Current Machinery
Thermodynamics
Applied Kinematics and Theory of Machines
Fundamentals of Airplane Theory and Design

ELECTIVES

Industrial Plants
Industrial Psychology
American Government
Military Science

Fourth Year
(First Term)

AERONAUTICAL OPTION

Theory and Practice of Airplane Design
Aerodynamics, Theoretical and Experimental
Airplane Engines and Installation
Airships, Theory and Design
Internal-Combustion Engines
Advanced Applied Mechanics

(Second Term)

Advanced Theory of Airplane Design
Aerodynamics, Theoretical and Experimental
Propeller Design
Economics of Aircraft Transportation
Metallurgy
Advanced Mechanical Laboratory
Thesis, or
Aeronautical Laboratory

Fourth Year
(First Term)

AIR-TRANSPORT OPTION

Statistics and Graphical Presentation
Airplane Engines and Installation
Internal-Combustion Engines
Air Transportation
Aircraft for Air Transport
Airport Design
Aviation and Commercial Law

(Second Term)

Thesis
Air Transportation
Accountancy and Economics of Aircraft Transport.
Aeronautical Meteorology
Aircraft Instruments and Navigation
Aircraft Radio and Lighting
Field work in Air Transport
Industrial Relations, or
Business Organization

RADIO ON THE WORLD'S AIRLINES

(*Continued from page 39*)

a period of almost two years. By June, 1930, the company had all of its airplanes equipped, and had established eighteen ground stations, located at the following points:

Chicago, Illinois	Reno, Nevada
Iowa City, Iowa	Sacramento, California
Des Moines, Iowa	Oakland, California
Omaha, Nebraska	Fresno, California
North Platte, Nebraska	Los Angeles, California
Cheyenne, Wyoming	Redding, California
Rock Springs, Wyoming	Medford, Oregon
Salt Lake City, Utah	Portland, Oregon
Elko, Nevada	Seattle, Washington

In daylight a frequency of 5,660 kilocycles (53.0 meters) is used by both airplanes and ground stations; at night operations are shifted to a frequency of 3,172 kilocycles (94.0 meters). The change in wavelength from day to night, though adding considerable complication to the operation of the system, has been found necessary if continuous communication with the planes is to be maintained. This is because of the fact that small fixed antennas, stretched between the wing tips and the mast, have been adopted in order to obviate the use of a trailing wire. The efficiency of this small antenna is not very high at wavelengths in the ninety-meter band, and therefore during the daylight hours when transmission conditions are at their worst a shift is made to the fifty-meter band, where the signals carry farther and the radiating characteristics of the antennas are much improved. The shorter wave cannot be used at night, however, because of the "skip" phenomenon—that is, signals are erratic and fade out during the first 200 or 300 miles, although they may be heard with good intensity at distances of 1,000 miles or more. To obtain continuous communication it is then necessary to work in the ninety-meter band where these conditions are not prevalent.

Although some difficulties have been experienced in the Rocky Mountain territory, on the whole the operation of the system has been remarkably successful. Since a majority of the planes are of the single-engined mail type, the manipulation and control of the apparatus has been made as simple as possible so that the pilots themselves are able to carry on communication at the same time that they are flying the ships. It was principally for this reason that radio telephone was chosen instead of radio telegraph. A special type of microphone was developed which fastens to the helmet, while the "talk-receive" button is mounted on top of the "stick," thereby permitting conversation without its being necessary to take the hands off any of the flying controls.

In normal operation the planes report their positions every fifteen minutes, although continuous watch is maintained both on the planes and at the ground stations in case special messages of any sort are necessary. At half hourly intervals the ground stations exchange dispatch messages and weather reports between themselves, beginning first at one end of the line and then relaying to the other end and back again. These "sequences," as they are called, are usually completed in less than ten minutes. At almost any point in the Western part of the United States, and at many places in the East also, it is possible to pick up the ground stations and airplanes on a good short-wave receiver. Many interesting reports of long-distance reception have been received.

Although the radio telephone is used for point-to-point transmission of dispatch messages and weather reports, the company uses ordinary wire line telegraph for operations.

(*Continued on following page*)

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traffic and general company business.

Western Air Express began its radio operations in 1926 with three radio telegraph stations located at Los Angeles, California; Las Vegas, Nevada; and Salt Lake City, Utah. The point-to-point radio formed about the only possible link of communication between these three places that was available. Later this network was extended, as the lines of the company grew, until twenty-nine stations are in operation, located at the following places:

Los Angeles, California	Pueblo, Colorado
Las Vegas, Nevada	Denver, Colorado
Salt Lake City, Utah	Tulsa, Oklahoma
Oakland, California	Oklahoma City, Oklahoma
Montague, California	Wichita Falls, Texas
Portland, Oregon	Dallas, Texas
Seattle, Washington	Midland, Texas
Kingman, Arizona	Abilene, Texas
Flagstaff, Arizona	El Paso, Texas
Holbrook, Arizona	Douglas, Arizona
Albuquerque, New Mexico	Phoenix, Arizona
Amarillo, Texas	El Centro, California
Wichita, Kansas	San Diego, California
Kansas City, Missouri	Avalon, California
Dodge City, Kansas	

General communication was carried on at 6,350 kilocycles (47.0 meters) in daylight and 3,460 kilocycles (86.0 meters) at night, although a few of the major points were tied together by a direct secondary network in daylight at 8,015 kilocycles (37.0 meters) and 12,180 kilocycles (24.0 meters). This double network of stations made possible a very complete weather reporting system, and provided utmost speed in handling dispatch and emergency messages.

Experiments were undertaken in 1929 to determine whether radiotelephone or telegraph would be the most practical for two-way communication with the planes. The radio telephone offered so many advantages that it was decided to wait until commercial apparatus became available before installation was started. By August of 1930 all of the company's planes and ground stations on the three major routes had been equipped with radio telephone. This communication is carried on at 3,070 kilocycles (98.0 meters). The operation of the system has been very satisfactory considering the length of time since the equipment became available and could be installed. It is probable that at a later time daylight communication will be carried on in the fifty-meter band, inasmuch as fixed antennas are being used on the planes and the maximum of efficiency is therefore necessary during the daytime.

In the next article of this series the radio systems of the other American transport companies will be described, including American Airways, Inc., operating unit of the Aviation Corporation (Del.), Pan American Airways, and New York, Rio and Buenos Aires Line. A brief outline of the events leading up to the formation of Aeronautical Radio, Inc.—a coöperative non-profit organization set up by the major airlines of the United States—will also be given.

AIR—HOT AND OTHERWISE

(Continued from page 50)

that stand and ceased to fight against it in the Senate only when they found that the committee hearings were carrying popular education, as to the flim-flam of the naval fetish, so far that the whole world would presently be wise to the uselessness of their floating relics of pre-aircraft days.

Through every generation it has been almost impossible for male minds beneath the plumed hats of admirals to realize that the Constitution of this country provides civilian control of naval and military activities, not naval and military control of civilian bank accounts.

The United States Navy is no longer merely an arm of defense—it has been degenerated into one of the most powerful political instruments in this or any other country. Its "experts" no longer technically "advise" anybody. They seek to enforce their own old ideas of the national security regardless of the efficiency of those ideas in the changed circumstances of an air age and regardless of the taxpayer's money.

This nation and the other nations of the world are turning toward aviation as a major arm of preparedness for war.

This handwritten message has been upon the wall in Washington for a considerable time, but the keenness of the naval sailors' terror, plus the cleverness of their political training, has enabled naval officers to stall off aviation to a degree which very well might have imperilled that national safety which they are sworn to guard as their own lives.

They virtually say that if aviation has any purpose whatsoever it is (to quote what amounts to a motto of the Navy) "to aid the fleet in the achievement of victory." You never hear a naval man speak of helping the United States to victory. It always is "the fleet" which must be helped. The fleets from now on will certainly need help!

These sad, and silly, old seadogs who are fighting aviation are well aware that an armada of 10,000 airplanes, each carrying, for instance, a 1,000-pound bomb, flying beyond the reach of naval guns toward an objective, cannot be rightly called "auxiliary" to either Army or Navy. AVIATION IS A SEPARATE ARM OF PRIME IMPORTANCE TO THE NATIONAL DEFENSE. PERHAPS IT IS THE MAJOR ARM.

Army and Navy control should be concentrated under a single cabinet head, a Secretary of National Defense.

The Army Chief of Staff would go straight to the Secretary of Defense. The admiral ranking as chief of the naval fighting forces would go straight to the same Secretary. Having judicial as well as executive qualities, the Secretary of National Defense would listen, weigh, weed out, decide—and go straight to the President.

That would be in strict conformity with the methods followed in all good businesses.

Under a Secretary for National Defense, air effort (naval, military and civilian auxiliary) for the first time in the nation's history would have that which at present is impossible—a really fair opportunity. And a fair opportunity for aviation means a fair show for the nation in a national emergency.

CHICAGO AIR RACES

(Continued from page 49)

The list of entries in this race includes Capt. Arthur Page, U.S.M.C., flying a special Curtiss Hawk monoplane; Capt. Frank M. Hawks, *Texaco* 13, Travel Air; George W. Haldeman, Bellanca Pacemaker; Lieut. Alford J. Williams, special Curtiss racer. Lieutenant Williams recently returned from abroad with several prominent European pilots who will participate in the international stunting exhibitions and other events to be held at the races. Included in this group of foreign fliers are Flight Lieutenant R. L. R. Atcherley, England; Marcel Doret, France;

(Continued on following page)

(*Continued from preceding page*)

P. Columbo, Italy; and Loese, Germany. It is expected that several of these pilots will compete in the Thompson Trophy Race.

The special days are designated as follows (subject to change):

Saturday, August 23—Inaugural Day. Opening ceremonies.

Sunday, August 24—All Illinois Day. Fox Valley Day.

Monday, August 25—Governor's Day. Women's Aviation Day. (Women's Luncheon, Engineer's Luncheon). Engineer's Day. A.S.M.E. Luncheon. North Shore Day.

Tuesday, August 26—Association of Commerce Day. (Association of Commerce Luncheon.) Boy Scout Day. Tri-City Day. Press Club Day.

Wednesday, August 27—Rotary Club Day. Early Birds Day. British Day. Midland Club Day. (Rotary Luncheon.) Chicago Athletic Club Day. Joliet Day. Cincinnati Day.

Thursday, August 28—Hoosier Day. Kiwanis Club Day. South Shore Day. Cleveland Day. (Kiwanis Luncheon.) S.A.E. Day. Illinois Athletic Club Day.

Friday, August 29—Wolverine Day. Navy Day. Exchange Club Day. Lake Shore Athletic Club Day. (Exchange Luncheon.)

Saturday, August 30—Lions' Club Day. Army Day. (Lions' Luncheon.) American Legion Day.

Sunday, August 31—All Nations' Day.

Monday, September 1—All Wisconsin Day. Milwaukee Day.

WHY NOT A NATIONAL AIR WEEK?

(*Continued from page 37*)

ther commercial aviation, but I am not convinced that the best manner of doing this is by the means suggested. Permit me . . . to assure you that my thought is always for the best interest of aviation."

David S. Ingalls, Assistant Secretary of the Navy for Aeronautics, writes as follows: "I do not feel that in my position I could with propriety take any part in a movement such as you suggest, which is essentially commercial in its basis. . . . In the last few years aviation, due to suddenly awakened popular interest, achieved a very rapid growth, so rapid that it outgrew its foundations and therefore suffered all the more in the period of industrial depression last fall. It now appears to be making a healthy comeback. I doubt if any artificial stimulation such as the drive you suggest, would, over a considerable period of time, have a healthy effect on the industry."

Among the few executives of aeronautical manufacturing concerns approached with this inquiry, comment is brief but generally favorable to the idea of a National Air Week. From Edward V. Rickenbacker, vice president and director of sales, Fokker Aircraft Corporation of America, we have this characteristic statement: "Think it is a splendid thing! Believe the industry through the Aeronautical Chamber of Commerce should be able to get President Hoover to issue a proclamation designating a certain date for National Air Week. . . . Possibly would be able to lend my assistance in some humble way."

William B. Stout, president, Stout Metal Airplane Company, with usual gusto and progressiveness writes: "The idea of a National Air Week, properly managed, certainly should be a boost to aviation in general. I am all for it, provided we could make it more than a mere barnstorming week and get some real commercial activity into the program."

Speaking for both himself and Lieutenant-Commander Bruce G. Leighton of his organization, Earl E. Hughes, manager of sales promotion, Wright Aeronautical Corporation, concisely says: "I thought the idea excellent!" Mr. Hughes adds: "This is something that would have to be under the jurisdiction of the Aeronautical Chamber of Commerce."

In his interesting letter pointing out the activities of N. V. Clements of his organization along the lines of planning a National Air Week, C. S. (Casey) Jones, president, Curtiss-Wright Flying Service, wrote as follows:

"We felt so strongly concerning the idea that we have outlined the proposition and sent it to all the aeronautical magazines, requesting that they publish it and get comments from the industry as to their thoughts on the subject, and if it met with general approval, the idea was to sponsor this through the Aeronautical Chamber of Commerce."

A. E. Saunders, engineering secretary, Packard Motor Car Company, replying for Col. J. G. Vincent, writes: "After a complete study of the situation, it has been decided that we, as a company, should not engage in the matter at the present time. We feel that an event of this sort is primarily one for the airplane manufacturer, and that we, as motor builders, should play only a secondary part in whatever you may develop." Mr. Saunders, nevertheless, denotes the good-will of Packard toward National Air Week by wishing us "the success the idea deserves."

Coming now to executives active in the publishing business, we have a communication from Frank A. Tichenor, loyal publisher of AERO DIGEST. He ended his enthusiastic letter with the statement: "You know that we will do our part in getting it under way." To which the present publication of this report amply testifies.

The energetic editor of *Air Transportation,* Laurence A. Nixon, writes one of the most practical-minded letters received. "I honestly think," he says, "that starting right now and planning a National Air Week for next spring would not be a bit too soon. Say, run the Air Week in May, 1931, when we are sure of good weather almost everywhere, and when we can get millions of people out to the airports, so that they will come back every week all summer long and patronize the operators. . . . I'll be mighty glad to coöperate on any movement of this kind." In his own publication, he later said: "No one outstanding manufacturer is big enough to handle the promotion of a National Air Week. To be properly successful, it would require the coöperation, financial and moral, of all outstanding concerns in the industry."

I have a letter from Edward P. Warner, editor of *Aviation,* but Mr. Warner does not wish to be quoted. I believe he will have no objection, however, to my pointing out that, if he should see any way of furthering the idea of a National Air Week in order to make it definitely useful, he will be glad to do all he can.

Robert J. Pritchard, editor of *Western Flying,* assures the industry of his hearty sympathy with this project. "It should go a long way," he says, "toward establishing more universal confidence in and understanding of aviation."

"Properly organized and publicized," says William R. Enyart, editor of *The National Aeronautic Review,* "it unquestionably would be of value in the development of aviation. I shall be very glad to give my personal assistance where this is practicable. . . . Please let me know what you plan on doing in regard to such a project. You no doubt will want to form a nucleus of individuals to set up the general form and plan of operation of such a National Air Week."

(*Continued on following page*)

the *Better Spark Plug*

- **in the Air**
- **on land**
- **on water**

The supremacy of Champion Spark Plugs is known and recognized the world over.

On land and water, their better performance gives every engine more zip, zest and faster get-up, with greater economy. In the air, Champion Aero As assure you of top revs whenever you need them . . . . the certainty that they will always answer the gun . . . . plus the all-around *greater safety* that is exclusively theirs.

The danger of conking from spark plug failure is eliminated by their use.

The Aero A has revolutionized the meaning of performance in aircraft engines. Built to give far greater safety under the punishing requirements which aviation demands from spark plugs, pre-ignition and fouling are virtually impossible. Its unique design, and its exclusive Sillimanite dual insulators, *positively prevent interference with engine operation* in the remote event of insulator breakage.

Its safety, greater number of hours of dependable service, and better performance, have made the Aero A the better aviation spark plug, just as other Champions are the better spark plugs on land and water.

CHAMPION

Spark Plugs

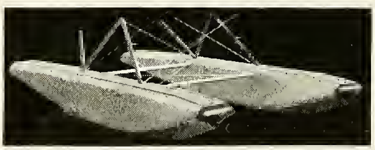
TOLEDO, OHIO WINDSOR, ONTARIO

Ready for Action!

EDO FLOATS

THE bird dog sniffs the air... rifle and shotgun are put into pink of condition... camp duffle is gathered... the hunting season is at hand and soon sportsmen will seek the wooded lakes and marshy shores where game abounds.

EDO Float equipped planes, for charter to sportsmen who seek the quickest way to their favorite haunts, are yearly paying goodly profits. Transport operators have ample time to install EDO Floats on their land equipment. Complete installations are promptly available for over 30 types of land planes, licensed in Canada and the United States—more than all other makes of floats combined. For full details, address: EDO Aircraft Corporation, 610 Second Street, College Point, Long Island, N. Y.



NOTE THESE POINTS OF EDO FLOATS

All metal construction.
Anodically treated against corrosion.
Will not swell, shrink or absorb water.
Water-tight bulkheads every 2 feet.
Patented fluted bottom for quick take-off.
Heavy keels, shallow sterns for beaching.
Flat decks for ease of taking on loads.
Wide sterns for perfect taxying.
Easy to install and overhaul.

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From the New York *Times*, aviation department, R. M. Cleveland writes: "I have made a few inquiries as to how the proposal for a National Air Week would be received. . . . My suggestion would be to lay the foundation for it early next year, and I shall be glad to be informed of any plans you may have in regard to the matter. The thing should go over with a bang, if at all, and for this reason I think it should have ample prior preparation."

Sherman B. Altick, aviation editor of the New York *Sun*, declares: "It seems to me that conditions in the industry at present do not warrant the trying of such an experiment. Many aircraft executives feel that there have been too many air shows, and their policy is that of retrenchment. If the proper time is chosen for such an Air Week and conditions in the industry are healthy, and the public also has money available to purchase aircraft and equipment, the idea might go over in a big way."

Says Carl B. Allen, aviation editor of the New York *World*, "On the whole, I think your idea of a National Air Week is good. The only objection that I can see at first glance is that the public in general is pretty well fed up on 'weeks' of all kinds. As you know, there is at present a 'week' for just everything from saving a life to being kind to animals and taking care of the dear little wild flowers.

"Certainly your scheme, if intelligently worked out, ought to go far in stimulating the right kind of interest in aviation, with a chance that much of the results obtained would be permanent. And there is very little doubt that the industry would welcome a break of this kind at present."

Only the large airline operators were approached. T. B. Clement, general traffic manager, T.A.T.—Maddux Air Lines, leaves no doubt as to the difficulties which he believes to exist in this movement. In his first communication, Mr. Clement candidly states: "The suggestion no doubt has considerable merit but of course could not be put over successfully without a rather generous advertising appropriation. At the present time we have no such appropriation which would enable us to coöperate in the movement. Naturally we could not expect to share the benefits without bearing our portion of the costs, so I am afraid we will have to be counted out."

In reply to this, I wrote: "Frankly, I doubt whether an advertising campaign would be either necessary or advisable in the promotion of such an event. It is not essentially an advertising proposition. It is primarily a publicity job."

Mr. Clement's second letter is not only an earnest expression of opinion but extremely interesting, and it strikes a note which must be held firmly in mind if this National Air Week project gains any momentum. "I believe, of course," Mr. Clement says, "that the public should be fully informed of the progress of American aviation in all its phases, but I do not feel that the proposed Air Week is the best means of keeping the public informed. While the aims of the various sections of the aviation industry—transport, manufacturing, sightseeing and flying services—may be unified in many repects, there are at the same time a number of aviation activities to the value of which we cannot all agree. To cite but one example: I feel that the so-called stunts and exhibition flying which are always a part of racing meets do a great deal of harm to the transport activities. On the other hand, stunts and exhibition flying are no doubt a necessary part of the development of aviation as a whole. In other words, my personal opinion is that the interests of aviation can best be publicized and brought to the attention of the public through the activities of the individual companies."

Joseph W. Sabin, general traffic manager, Universal Aviation Corporation, sounds a more or less similar note. Mr. Sabin assures us of his firm's "whole-hearted coöperation." In his discussion of the National Air Week idea, he says: "From a great many standpoints the plan that you have would be made to produce very definite results. On the other hand, most of the air operators have been working under a very severe handicap in that there were so many more people desiring transportation than could be supplied with seats. By this I mean that we have no sales problem but have a very acute service problem. There is a limit to the number of schedules that can be operated satisfactorily. Consequently, every schedule has turned down a fair quota of prospective air travelers. This condition would have a tendency to make it extremely difficult for the operators to help you to any great extent on National Air Week from a standpoint of special rates, etc."

C. W. H. Smith, general traffic manager, Western Air Express, Inc., says: "I believe a National Air Week would be a good thing for the industry provided that the Aeronautical Chamber of Commerce would undertake to put it over in the proper manner. Otherwise, I do not believe that it would be a success. . . . If the Chamber undertakes to sponsor National Air Week, we will cooperate in every way to make it a success and will not only endorse it, but will devote time and effort towards putting it over."

From George W. Orr, president, Roosevelt Field, Inc., I have received one of the most stimulating letters. "Aviation in general would certainly be helped," says Mr. Orr, "by concentrating the minds of the public on flying, and such a movement could be so general that it would not place a burden on any group in the industry. On the contrary, it could be profitably carried out by the various units coöperating in the movement. As an example, Roosevelt Field not only operates a comercial airport, perhaps without a parallel in the world, but operates a flying service and an aviation school. With the attention of the country focussed on aviation, we could and would put on special programs attracting the people in the area affected by our operations. From the airport end, the manufacturers of airplanes and accessories having sales agencies on the field would be invited to have their demonstrators on display. Our school and flying service could put on an interesting demonstration. Such a program would focus the attention of the public on flying in an educational way and at the same time we would all benefit by the advertising and sales opportunity presented.

"If this were duplicated by each operator in his own locality, the week could not fail to be a tremendous success. Aviation as an industry would have a decided boost and the operators, instead of carrying a burden, would receive immediately their tangible results. The problem is to get the movement concentrated in one controlling organization, which would be willing to assume the considerable burden of effort and expense necessary to make it a success. It seems, however, that the good which certainly could be accomplished would be a challenge to such an organization as the Aeronautical Chamber of Commerce or the N. A. A."

Four aviation associations were communicated with. Carl F. Egge, executive secretary, National Air Pilots Association, writes in part as follows: "I question whether another activity along the line of publicity will meet with very hearty approval, particularly if the expenditure of money is involved. Practically all engaged in the industry

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hold membership in the Aeronautical Chamber of Commerce, and no doubt if the proposed National Air Week has the sanction of that organization it may go over with some degree of success. Apparently the dear public is 'air-minded' or 'air-conscious' to the extent it likes to see airplanes, but we know that few ships are being sold and very few passengers are carried. . . . If the project goes through we will be pleased to give the matter publicity. Naturally, the pilots are very much interested in the legitimate promotion of anything that may arouse interest in aviation."

The Quiet Birdmen speak of National Air Week through a member, William P. Hamann, who in his letter says: "Some effort to stimulate a substantial interest among average individuals in the transportation advantages of aviation is always valuable if properly promoted." He points out that the quorum of QBs present when this matter was discussed, including such experienced men as Clayton Knight, Fred Melchior, Harry Rogers, R. MacMullen and J. Iseman. "All agreed that were it possible to organize operators and interested factors in offering special inducements to get people into the air, this would undoubtedly be a forward step in the progress of aviation." The QBs feel that the world "Week" should be eliminated from such a movement, in the belief that "Weeks of all sorts are becoming a nuisance," and that with some other style of appellation "a better acceptance would materialize."

W. R. Root, Manufacturers Aircraft Association, Inc., writes to explain that his organization's scope of activities is now limited to patents, and that he refers the matter to the Aeronautical Chamber of Commerce.

Of course, I approached the Chamber, and learned that it has had the subject of a Natonal Air Week "under discussion for some time." It is not possible to quote any representative of this organization, which can act only on decision of its Board of Governors, comprising twenty-seven aeronautical leaders. Suffice it to say that the matter will continue to receive their careful study and attention.

I mentioned above that National Air Week must be planned on the practical lines of a sales campaign, or not at all. It is not my place to offer a plan. That can be developed only by patient and studious collaboration of many minds. National Air Week can be promoted only on a large perspective. Anyone of aeronautical experience, with a touch of vision, can envisage the many possible details that would enter the development of such a program; the real job will be to select only those details which will give the final plan a practical character and a sound structure.

Let us summarize the various opinions quoted here.

First, the sense of opinion indicates, as so many have separately suggested, that a National Air Week can be best promoted by or under the auspices of the Aeronautical Chamber of Commerce. It might be reasoned that because the avenue of aeronautical development most accessible to public interest is unquestionably the airline, a plan for National Air Week might do well to revolve around our national airlines, in which case it would seem logical to suggest promoting the movement through the Air Transport Section of the Chamber. In this event, however, there is no reason to suppose that such a direction of approach to the matter would in any way deprive other outstanding factors of the industry from either a full participation in or a complete benefit from a National Air Week. It would simply mean that transportation would head up the movement.

Second, the trend of opinion is that the movement should be kept strictly commercial. No doubt the Services would contribute with formation and airship flights on a grand scale, but Service stunting, racing and localized exhibition work would not express the true purpose of an educational National Air Week drive.

Third, it would appear that the movement will command adequate support from all quarters.

Fourth, the expense to the industry at large should be almost negligible in comparison with the costs of any other plan of promotion I have ever heard of. For example, the estimated cost of a collective all-year-'round advertising campaign taxing all members of the industry (the effect of which could not possibly be predicted with confidence, short of an appropriation of $1,500,000 or more), or even the ultimate cost-to-the-individual imposed by the increasing multiplicity of air shows—far and away overshadows the probable expense of a National Air Week. In this connection, Editor Nixon writes to me: "A fund of $30,000 to $40,000 would be necessary for overhead." Mr. Nixon from personal experience with "national weeks" believes that no more than this amount would be required to make it a real success.

Fifth, obviously all hands would have to be joined. The impressiveness of a National Air Week would depend entirely upon the collective energy and activity of all the industry. The individual benefits would depend largely on the aggressiveness with which the individual organization went at the promotion of its own interests within its own locality or within the territory of its operations.

I have attempted here to present the pros and cons just as they have come to me. My purpose in laying this report before the industry is to provide not only discussion, but action. This is as far as I am able to go. Any comment this report may invite from the reader, therefore, should be directed not to myself, but to Mr. Tichenor, Publisher of AERO DIGEST.

HAPPY DAZE

(*Continued from page 42*)

the suggestion. "Do you seriously suggest that I should fly? Me, a man with a wife and three children?—Not to mention a secretary? Why, man, that's a game for *heroes*, that is!"

And we're not heroes, and we don't want to be. We're plain, homely E. Pluribus Publico, who never took a chance in our lives if we could avoid it. Why, we don't even drive our car fast, and we mutter curses at the speeder who crowds past us on the road. We believe in being safe. We don't take chances even crossing the street—let the young people rush across, we'll wait for the light. Hang it!—we have a wife and family to consider.

Our friend, we'll say, is a bit of an air bug. He likes to drive out to Curtiss Airport on Sundays and go for a flight. When he went to the Coast last month he flew there. Fancy that now! Quite a fellow, isn't he? But of course, he's not married. All very well for the single chaps, perhaps. Anyhow, our friend says, "Read about this here aviation. You'll be surprised. Why, they've got airlines operating on regular schedules practically everywhere."

We're an up and coming citizen, we are, so we think a little about this aviation. Our friend says it's quite a thing, so we read the aviation news with somewhat more interest. We're glad to learn about this new thing, we don't want to be behind the times.

"Here's an item right here in the paper. Well, well! Look at that, now! Isn't *that* amazing! Pilot Puddenhed does forty-six continuous outside loops! He holds the record. By George, there's a brave fellow for you!

(*Continued on following page*)

(*Continued from preceding page*)

"Oh! What's this?—Dear, dear!—'Pilot Nittwitt dies when plane breaks up during outside loop.' H'mm. You say aviation is safe?"

Our friend assures us that it is perfectly safe. "Pilot Nittwitt simply didn't know what he was about, that's all. He probably did something wrong. Anyhow, he should have had a parachute. If he'd had a parachute, now, he'd have come down as soft as a feather."

We, however, are not reassured. We have less than no desire to come down as soft as a feather. Stepping out into a mile of air, holding onto something like an umbrella, is not our idea of a pleasant experience. We don't have to do it on the train, so why go on an airliner where such antics may be expected of us?

But they're not expected, says the friend. The airliners don't do loops or any stunts. They simply go along. So does the air mail. Why, flying is safe as anything else. These stunts pilots are not flying passengers on airlines—or if they are, they're not stunting while they have passengers with them.

Well, perhaps not, we think. Perhaps not. But perhaps yes. How are we, sitting there nervously in the cabin, to know how that bold pilot is feeling? May he not feel an outside loop coming on him? And if he does, what can we do about it? There are careful and conservative pilots, without a doubt, but how do *we* know them? *We* don't know anything about aviation or pilots *except what we read in the papers*. And there we read where some one of them has smacked the ground for one reason or another. What do we know or care about *reasons,* anyhow? If we go up in those things and get killed, of what benefit is it to our family to learn that we died with one of the best pilots in the business, simply because the weather got too bad even for him?

However, we continue to read about aviation. After all, our friend flies, and he's still alive. Some people find it safe enough, and others pass out. What's this here in the paper? "ANOTHER CATERPILLAR CLUB MEMBER." Well, I declare! Those fellows are always jumping out, aren't they? Now, how am I to know, as I ride along in the airliner, that the pilot won't strike bad weather and jump out? Wouldn't my family and I feel like fools in that liner with no pilot? What! Those kind of pilots don't jump out? They don't leave helpless passengers to crash to their deaths? They don't, don't they? How about that stunt pilot on the Coast last year who jumped out and left his mechanic to die? He didn't even tell him he was going to jump. I remember that well. Oh, he was kicked out of the pilots' association for doing that, was he? Well, I suppose that was a great satisfaction to his passenger's widow.

No sir! How do I know my pilot isn't going to jump and leave me, and get kicked out of the association for it? I don't know anything about pilots or airlines or airplanes. All I know is what I read, and what I read is that somebody dies every so often, and I want to live a while, that's all.

Well, folks, no need to continue this sort of thing. I have talked to many of the kind of men I have supposed us to be as we looked at aviation. And the way they felt about it was the way I have written it down here. I have not exaggerated the mental attitude of the vast majority of the conservative people who could and would support aviation if they could be convinced that it was both safe and useful for them to support it.

Let's clear up one point that I believe is somewhat clouded. You who read this undoubtedly are interested in aviation or you wouldn't be reading it. Probably you think aviation is useful and reasonably safe; you believe that it is necessary to the national defense plan; you feel that it is important that transportation should be speeded up; you can't, perhaps, understand why everyone is not at least slightly interested in a science that interests you so greatly.

They are *not* interested, and for the same reason that you are not interested in the railroads, submarines, chiropody, the collecting of stamps. The reason is that they're simply not interested. Most of them never will be. You, for example, probably are not interested in the automobile industry, unless you work in it. You are, of course, interested in your particular car. You are pleased with the service it gives you; you are glad that motor buses carry you safely and conveniently where you may want to go. But you are not interested in the auto industry. Why should you be? In order that the automobile industry should profit from your buying a car or riding in a bus it is utterly unnecessary that you should in the slightest degree be interested in that industry. All that is required is that you should want auto service enough to force you to buy a car or a ticket on the bus. Do that, and the automobile business doesn't care whether you're otherwise interested or not.

What do we in aviation care whether or not the public is "interested in aviation?" Most of them never will be. They may, however, be interested in getting quickly and safely from one place to another; they may be interested in getting their letters and their goods quickly about the country; they may be interested in having a plane for the sport of it, as they have a motor boat.

The trouble with aviation, as I see it, is that it is still in the growing boy, or coltish, stage. It's kicking up its heels and showing off, and saying, "Look at me, folks! Ain't I simply grand? Watch me do an outside loop, watch me stunt, watch me hurtle through impossible weather, watch me fly across an ocean in equipment quite unsuitable for the business of safely and sanely transporting passengers across that ocean. Ain't I bold?"

The public, which is not at all bold, glances at aviation with a combination of admiration and amusement and sometimes irritation. It regards aviation precisely as it regards an obstreperous youth who may be all right when he grows up. It was freely predicted, for instance, that I would eventually be hung. I amused some and annoyed others, and I made very slim profits. It was only when I went to work and rendered a *service* that the world paid me. It is only when aviation renders a real service that the world is going to pay for it.

You may tell me that aviation does render a service now. Of course. And so did I when I was sixteen. But one day I gave a service and next day I was out raising Cain generally. Which is precisely what aviation, *en masse,* is doing now. Right beside the sensible and useful airlines, schools, factories, air mail, sport flying, and so on, we have death-defying antics—performed, it is true, by a small minority of the fraternity. *But it is all part and parcel of aviation. And the public does not distinguish between the two.* Make no mistake about that. In your mind—you who understand aviation—there is a distinction. In the great public mind there is none.

You, for example, know that when a plane is overloaded for a long flight that the safety factor has been very largely removed. When an overloaded plane encounters rough air and falls apart, or when it blows a tire staggering under an overload and is wrecked, you know that

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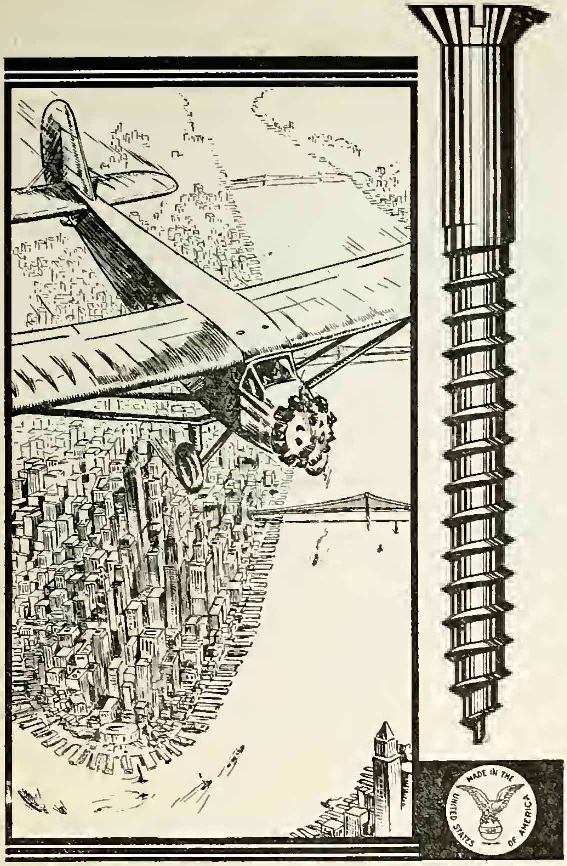

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WACO AIRPLANES

"Ask any pilot"

(*Continued from preceding page*)

the equipment was overstrained, and you are not surprised. You do not say, "There! Aviation isn't safe!" But the public says precisely that. When a man tears his ship apart in a foolish and useless stunt and lands in the obituary columns instead of on the front page that he was hoping to land on, you do not say, "Airplanes are dangerous." But the public says so, and proves it to us by staying out of the air in anything like paying numbers.

As I see aviation—and I've been looking at it for a long time—it is still in a happy daze. It's a healthy, frisky, growing kid among the transportation industries. It is indulging in the same horse-play that all youngsters indulge in, and it's enjoying itself hugely, even if some of the stockholders aren't. However, it would be well to remember that all youngsters must grow up eventually, and that until they do grow up the world doesn't pay them a very large salary. Of course, if we're all to drink of the fountain of eternal youth and keep on skylarking, let's announce the fact. Let's not try to grow up—there's no fun in maturity, anyhow. It all depends on what we want to do.

We've announced to the world, however, that we are now of age, able to pull our share of the world's load of transportation—that part of it that wants to go fast. Along with that announcement we kick up our heels, do an endurance contest, an outside loop, and an overseas flight in a landplane. What is the sensible world to think of all this? Do we mean what we *say*, or do we mean what we *do?* Do we, ourselves, know what we mean and want? We say one thing, and we do a thing directly opposite. Isn't it about time we decided what we're going to be when we finally grow up? Are we transportation people or tree sitters?

It must be said in excuse for us that we are working with one of the oddest things in the world—an airplane. It's the only thing in the world that can be so many things. In that lies our advantage, but also our handicap. It is the fastest and liveliest vehicle of transport the world ever has produced. It not only can transport people, messages and goods, it can exterminate men and bugs, with equal facility, by the use of bombs or arsenate of lead—if that's how you spell it. It can act as an aerial sedan, or as a scenic railway or roller coaster at an amusement park.

What is this thing called an airplane, anyhow? Is it a war weapon, a transportation unit, or an amusement park thriller, or is it merely something on which some nut can ride into the papers? Let's decide just what the thing actually *is,* and then *make* it *be* that.

Now, here—I'm going out to Chicago to act as a judge in what they call the National Air Races. That's what they *call* them, mind you—Air Races. Well, I don't know what all they'll do out there, but I know what they did at all the other so-called races. They had the races, all right, apparently to demonstrate to the public that these things could go fast and were safe. In addition, they had stunt flying, they had solo endurance flights, they had formation flying so tight that it was dangerous, they had fellows tearing airplanes apart practicing stunts, and coming down in parachutes after the wreck in the air.

In short, they had all the old hero stuff, the brave boy business—and they were supposed to be selling aviation to the general public, few of whom are brave boys or want to be. Sure, we can interest the public's brave lads with stunts. But those lads have no money. What we're trying to interest, I should say, is the older man, with money. We *may* be able to sell him fast transportation. We'll never, in a thousand years, sell him thrills, for he doesn't want them and won't buy them.

(*Continued on following page*)

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(*Continued from preceding page*)

It is useless for the transport operator, the manufacturer the school operator, to say, "My part of aviation is safe and sensible. The stunt part, the sensational part, has nothing to do with me." Of course it has something to do with you. It has very much to do with you in the public mind, for there you and the stunt man and the publicity hunter are one unit, under the label AVIATION. If you don't know that, you're still in a happy daze, and my earnest suggestion to you is that you wake up and snap out of it.

A CORRECTION. In the August issue of AERO DIGEST, while commenting upon the abandon with which some parachute jumpers apparently like to dive six feet under ground, I wrote: "The parachute he wears often is not the standard Army pack; it is something we have never seen before." I should have said that it was not the standard Army pack or any other reliable and proved type manufactured by reputable firms. I had no thought of suggesting that the Army type is the *only* desirable parachute, for of course there are several good 'chutes on the market. I therefore make this correction in case any reader misconstrued my meaning.

CY CALDWELL.

ECKENER—PUBLICIST, NAVIGATOR

(*Continued from page* 47)

establish a regular Pernambuco-Baltimore route on the tentative time tables now being dicussed by bankers in both Germany and America.

"Pernambuco-Baltimore route" is merely a phrase to express the idea of a linking of the two Americas. Baltimore is one port or terminal which is being considered by the backers of the recently organized International Zeppelin Transport Company, backed in the United States by the National City Company, United Aircraft and Transport, Goodyear-Zeppelin, Union Carbide and Chemical, and the Aluminum Corporation of America.

Commander J. C. Hunsaker, of the Goodyear-Zeppelin Company, Dr. Eckener and Mr. Paul W. Litchfield, president of both Goodyear and Goodyear-Zeppelin, visited a number of suggested airship ports, all south of America's favorite bad weather belt in which the Lakehurst Naval Air Station was located before the proper weather research had been carried out. The tentative plan is first to construct one dock and erect a number of mooring masts in the East. New York is likely to have one of these on some point like Governor's Island, provided the Army is willing. Then at first the line will be operated directly between Europe and the United States by airships built in both countries and owned in both Germany and America. These plans will no doubt be changed to coincide with the provisions of the McNary-Parker bill if in its present form it becomes a law. This bill grants Government aid in the form of mail contracts and loans for construction up to seventy-five per cent of the value of the airship, provided that airship is owned and operated under our flag. It is virtually an application of terms of the Smith-Jones ship subsidy measure to lighter-than-air transport, and its backers and proposed beneficiaries believe that it will, if passed, constitute an important aid to place the United States on a par with other countries in international air transport, a position this country relinquished more than half a century ago so far as surface marine is concerned.

Whatever the outcome on pending legislation, for the next few years at least Dr. Hugo Eckener will be an im-

(*Continued on following page*)

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portant figure in world commerce and commercial aeronautics. He and his associates have kept lighter-than-air alive through its most difficult years. The writer and propagandist ranks as a peer, or perhaps even a superior, to the engineers and inventors who have contributed to the same form of transport because he has held on through the most disheartening period in Zeppelin history to the time when the eyes of the world, largely through his efforts, are now turned on lighter-than-air.

PRINCIPLES OF AERODYNAMICS

(*Continued from page* 40)

stands still, the pressure has its maximum. This pressure is equal to the constant value $V^2\ \varrho/2 + p$ because the first term becomes zero. This maximum pressure, the constant sum of the pressure and the flow, is called the *total* pressure of the flow. It is called the total pressure of the entire flow, of all its points, although it exists as pressure at only a few points, if at all. The difference between the total pressure and the actual pressure is called the *dynamic* pressure. It can at once be seen that the magnitude of the dynamic pressure is $V^2\ \varrho/2$, where V denotes the velocity at the point considered. In general the dynamic pressure is different from point to point. Thus we have two different pressures at each point, neither of which is the actual or common pressure existing at that point in the common meaning of the word pressure. It is therefore necessary to give a special name to the actual pressure, in order to distinguish it from the two computed pressures. The genuine pressure is callel *static* pressure.

Static pressure plus *dynamic* pressure equals *total* pressure. The static pressure is felt, the other two are thought.

Dealing thus with three different kinds of pressure is confusing, and is apt to interfere with a distinct understanding of pressure as most people regard it. Only one pressure can and does exist at one point at the same time. This real and genuine pressure is called static pressure. Total pressure and the dynamic pressure have no physical reality and are only computed quantities, notwithstanding certain deceptive experimental evidence, which I shall discuss a little later. First a few remarks on the numerical computation of the dynamic pressure, $V^2\ \varrho/2$, are appropropriate. We saw that $\varrho/2$ is equal to 1/842 in standard British units, namely lbs. sec.^{2} /ft^4. This means, then, that to obtain the pressure in pounds per square foot, we must introduce the velocity in feet per second, square it, and divide it by 842.

In practice, we seldom measure the velocity in feet per second, but in miles per hour. One mile per hour equals 1.467 feet per second. Hence, when starting with the velocity in miles per hour, we must first convert it to feet per second, by which we obtain the dynamic pressure $V^2\ 1.467^2/842 = V^2/391$. At sea level, the dynamic pressure is obtained in pounds per square foot from the velocity in miles per hour by dividing its square by 391. The figure 391 is printed in large type because it must be remembered. For it is the only large figure, the only transformation multiplier and computation constant occurring in aerodynamic computations and occurring over and over again. It is the only numerical value of that kind suggested for memorizing.

What is the dynamic pressure of 100 miles per hour? It is 100 x 100/391 = 25.6 pounds per square foot at sea

(*Continued on following page*)

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(*Continued from preceding page*)

level. 25.6 pounds per square foot is then the largest pressure occurring at any point on the surface of the airplane flying at 100 miles per hour. It is certainly easy to compute that pressure.

The physical law of the low pressure, or suction at regions of large velocities, is often wrongly applied, because the conditions and limitations are not clearly understood. The three conditions are: absence of friction, steadiness of the flow and the perfect kind of flow called potential flow. This is secured in case of the airplane because all streamlines begin at points of constant total pressure. Only in a steady potential flow of frictionless air does the law of constant total pressure hold. This law is named after the man who discovered it, Daniel Bernoulli, the youngest of three famous physicists and engineers by that name.

It is easy to point out cases where Bernoulli's law does not hold and is not supposed to hold. For example, with the window of an automobile or of a railroad car open, the air outside has a different velocity than that inside, and still both have the same pressure, for if they had not the air would not flow by the window but would be forced into or out of the window. Similarly, the air set in motion by an office fan has a larger velocity than the air surrounding it, but the same pressure. The rotating fan does not execute a steady motion in the sense we use it, and hence fails to create a steady air flow. It is possible, however, to imagine something steady to take the place of the rotating fan. Then it becomes necessary to assume a pressure step at the fan, which explains the deviation from Bernoulli's law. Bernoulli's pressure law holds well enough for the airplane. On top of the wing there is a smaller pressure, and there is actually a larger air velocity than on the bottom. Neither of these two things, the larger velocity or the smaller pressure, are the cause of the lift, or of each other, but all are different symptoms of the same thing—lift caused by the change of motion of the air.

We now come back to the fallacy of imagining the dynamic pressure or the total pressure to be actually existant. This misunderstanding sometimes occurs because it is possible to measure the dynamic pressure or the total pressure. To do this such instruments at pitot tubes and the like are placed at the points where we want to determine the pressure, and by a fine tube or pipe are connected to a manometer. In this way the pressure at the point considered is actually conducted to the manometer and there measured. This is then the dynamic pressure or the total pressure, and it would seem that it actually does exist, in spite of our assertion that it does not.

It exists, indeed, after the pitot tube has been placed at the point in question. It did not exist, however, in the free and undisturbed air flow before the air motion at that point was blocked by the pilot tube from its original value to zero, thereby raising the static pressure from its original value by the dynamic pressure to the total pressure. That is the explanation. We are not discussing pressures which would exist after the insertion of certain instruments, but about pressures in the undisturbed flow.

Bernoulli's pressure law gives an upper limit to the pressure—i.e., the total pressure—but it does not give a lower limit. We must therefore be prepared for the occurrence of excessive suctions rather than of excessive pressures. We shall also see later that wings are supported by suction on top more than by pressure beneath, a fact for

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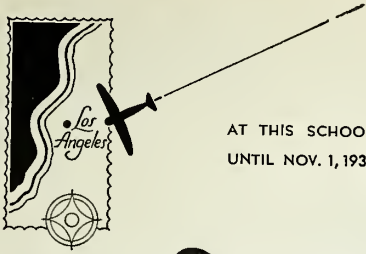

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(*Continued from preceding page*)

which we shall advance an explanation which differs from the present one, and which shows that this excess of suction is not very essential to the process of lift creation. Bernoulli's law also explains why it is possible to create very large suctions with venturi tubes, but only moderate pressures with pitot tubes, both for measuring and for other purposes.

Summing up, we can say that measured from a suitable standard, under ordinary conditions under which these arguments hold, and at sea level, the suction at any point of the air flow can be computed by squaring the velocity and dividing it by 391. This holds for steady flow only, and is another reason why the aerodynamic engineer prefers steady flows, and always talks of the air motion relative to the airplane, hitting it, passing by it, and so forth. Actually the airplane moves and does the hitting and passing, but that is not a steady motion and makes the pressure computation more complicated.

This is the third of a series of articles on Aerodynamics by Dr. Munk. To be continued in the October issue....

BELIEVE IT OR NOT OF AERONAUTICS

(*Continued from page* 48)

1903), Phillips (1893) and Sir Hiram Maxim (1895). Since the war a modern steam airplane has been built and flown, and this prime mover is seriously considered for giant airplanes. In 1810 Thomas Walker suggested the use of steam for the car of a balloon, and in 1852 and 1855 Giffard actually operated two large steam airships. In 1861 Moreaud was complimented by Delcourt on his progress in the application of steam to the balloon. The Wolf airship of 1885 was another full-sized steam craft.

1842—*Rocket Propulsion* was demonstrated in a model by Phillips. Louvrié proposed gunpowder reaction in 1863. In 1870 a logical system of rocket propulsion for aircraft was fully described by Trouvé to the French Academy. Other proposals were: Butler and Edwards (1867) and Gerard's drawing of 1784. In 1868 Quartermain exhibited a rocket engine.

1846—The *Flexible Trailing Edge,* a feature of many famous airplanes of modern times, had its beginning with Stringfellow (1846), followed by D'Esterno (1864), Danjard (1871), Pénaud (1872), Brown (1873), Pénaud and Gauchot (1876), Lilienthal (1889), Myers' kite (1892) and up through history.

1852—*Wheeled Chassis* was shown on the Loup machine of this year. Others which followed were those of Louvrié (1863, 1877), Kaufman (1868), Barnett (1877), Linfield (1878), Castel (1878), Tatin (1879), Frost (1890), Graffigny (1890) to the early French machines of 1908 and subsequently.

1857—The *Flexible Wing,* employed in a number of prewar airplanes abroad, had its apparent inception with the Du Temple machine and patent of 1857, if we disregard the Chinese "bird" kite of an unknown date, which was elastic in its construction. Others who made use of the scheme were: Claudel (1864), Lebris (1867), Tatin (1876), Goupil (1883), Sanderval (1884), Brearey (1879, 1885), Bazin kite (1888), Lilienthal (1891-1896), Chanute flexing tail (1896), Wright brothers (1900 on), Montgomery (1905) and many others within recollection.

1863—The De Louvrié machine had *Folding Wings,* as did those of Mouillard (1865), Wenham (1866), Jobert (1882), Ader (1890, 1897), Lilienthal (1891-1896) and Pilcher (1895).

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1866—The *Biplane* type of construction was patented in this year by Wenham and became standard construction in the period of Chanute.

1874—The aeronaut Donaldson permitted *Smoking in the Balloon* during an ascent from Cincinnati with four newspapermen and an assistant, on October 14.

1874—A *Balloon Wedding* took place in Donaldson's balloon, *P. T. Barnum*, over southern Ohio on October 19. The bride was Mary Walsh, equestrienne of Barnum's Roman Hippodrome; the groom, Charles M. Colton, also of the show. Others in the balloon were: Anna Yates, equestrienne, W. C. Coup, business manager; Rev. H. B. Jeffries and Donaldson himself, "dressed to kill."

1880—*Thomas A. Edison* conducted some helicopter experiments for James Gordon Bennett, using an electric motor for power. Then an attempt was made to make a power plant by using nitrate paper tape exploded by an electric spark as it was fed intermittently into a cylinder through copper rolls.

1880—General Daniel Ruggles patented a system for producing *Rainfall* by setting off explosives from balloons and asked Congress for an appropriation. Senator Farwell was interested and later the Department of Agriculture conducted experiments in Washington, D. C., and in Texas, beginning in 1891 and continuing the following year.

1881—An *Electric Drive* for airships was demonstrated in a model by Gaston Tissandier, who patented the invention. A cross-country trip with a full-sized ship was made October 8, 1883. On August 9, 1884, Renard and Krebs began a series of ascents with their electric airship which marked "the real advent of the airship era" (Ambassador Jusserand).

1893—An *Air Appropriation Bill*, which was introduced by Senator Cockrell on December 20 to award $100,000 for the invention of a five-ton aircraft, was pigeonholed in committee. A second bill introduced in 1895 for a similar purpose met a like fate.

1897—A *Polar Attempt by Air* was launched by Salomon August Andree with N. Strindberg and K. Fraenkel from Spitzbergen, July 11. The party was lost. In 1907 Walter Wellman started for the Pole by airship but was compelled to abandon the attempt because of storms. His second attempt was made August 15, 1909. An accident to the guide rope brought the venture to a close.

1905—*Gliding from Balloons* at high altitudes was practiced many times during the year by pilots employed by Professor Montgomery.

1906—The *First Aircraft Show* in America was held in the 69th Regiment Armory, New York, under the auspices of the Aero Club of America.

1907—H. C. Gammeter, inventor of the "Multigraph," demonstrated his *Ornithopter Which Raised Itself* momentarily off the ground with seven horsepower.

1907—*Portable Airship Mooring Mast* described by Captain Ferber in *Aérophile*.

1908—The *Aileron* as known today employed by Dr. William W. Christmas in his flight of March 8. The patent was later assigned to the Government for $100,000 and the device made free to the world.

1908—*Radio-to-Balloon* demonstrated on May 13 by Maj. Edgar Russel and Capt. Charles S. Wallace at Washington.

1908—*Newspaper Aeronautic Column* first inaugurated by the Philadelphia *Inquirer*.

1908—*First Radio-Controlled Aircraft* demonstrated by A. Leo Stevens and M. O. Anthony at Hoboken, N. J., with a model airship, on June 20.

1908—*Automobile in a Balloon*. G. L. Bumbaugh and Carl G. Fisher took up a Stoddard-Dayton at Indianapolis on October 30. The Dayton *Journal* published an air edition from Bumbaugh's balloon, June 29, 1909.

1908—*Flights with Seven-Horsepower* engine were made by Matthew B. Sellers on December 27. They continued into 1909. The machine weighed ready to fly but seventy-eight pounds.

1908—*First Aircraft Ordinance* passed by Kissimmee, Fla., July 17.

1909—*Air Marking* instituted by Amherst College on March 30. Kansas City Aero Club formulated program for city marking in 1911.

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1909—*First Motion Pictures From Airplane* taken from Wilbur Wright's biplane in France, April 24. In America E. R. Shaw photographed Beaumont, Tex., from Fowler's transcontinental airplane on December 17, 1911.

1909—*Berliner-Williams Helicopter* lifted J. Newton Williams at Washington, June 26.

1909—*First Newspaper Airplane Advertisements* appeared June 27 in three New York papers, advertising the Curtiss airplane.

1909—*Helium Gas* proposed for airship use by Prof. Erdmann at a lecture in Berlin about July 30.

1909—*Automatic Airplane* designed to carry a bomb or torpedo in place of a pilot, with automatic balancing and steering system, announced by Emile Berliner. During 1918-1919 the Army worked on a similar device.

1909—*Night Balloon Advertising* put into practice in New York in October by A. Leo Stevens under a contract with a local theatre.

1909—An *Anti-Aircraft Gun* demonstrated from a truck by Dr. S. W. McLean of Cleveland, Ohio.

1910—*Air Bombing Prohibited* by declarations signed at The Hague by twenty-seven nations and ratified by six, the United States, China, Great Britain, Netherlands, Bolivia, and Salvador.

1910—*Airship Transport Line* inaugurated in Germany on June 19 and conducted periodically up to the war, carrying 12,450 passengers in all.

1910—*Aerodynamic Course* instituted by Armour Institute of Technology.

1910—*Flight from Warship* first made by Eugene Ely on November 14 at Norfolk, Va. On January 18, 1911, he landed on a vessel's deck at San Francisco.

1910—*Radio From Airplane* demonstrated at Sheepshead Bay meet, August 27, by J. A. D. McCurdy. The device was that of Harry M. Horton. On March 6, 1911, McCurdy and P. G. B. (Bud) Morriss received and sent signals without the hanging antenna.

1911—*Steel Frame Airplane* began flying at Mineola about January 1.

1911—*Airplane Engine Starter* exhibited by Simms Magneto Company at New York air show, January 7-21. Many airplanes were so equipped by 1914.

1911—*First Air Mail Route* was flown by Earle Ovington from Nassau Boulevard to Mineola, September 23-30.

1911—*Sky Writing* demonstrated for military purposes by Army at College Park, Md., in October and at Ft. Riley in 1912.

1912—*Air Speed Indicator* put into service on Frank E. Boland's airplane in January. Boland's planes marked the organization of the present Aeromarine company.

1912—*Municipal Airport* urged in a campaign started in New York. Results were seen in 1928.

1912—Dr. Bell's *Tetrahedral Kite Flew* in Nova Scotia, J. A. D. McCurdy, pilot.

1912—R. R. Grant's *Inherently Stable Stall-Proof Airplane* flown during 1912-1913 by M. H. Simmons, beginning May 1, at Norfolk, Va.

1912—Capt. Chas. De F. Chandler demonstrated *First Airplane Machine Gun* on plane flown by Lieut. T. D. Milling.

1912—Silas Christofferson *Flew Off the Roof* of a hotel in Portland, Ore., using a 170-foot wooden runway.

1912—*Muffled Engines* were standard with Sturtevant company, and both Navy and Army ordered muffled power plants.

1913—Weldon B. Cooke flew his new airplane with

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Roberts *Inverted Engine* on January 20. About the same date the Army began trials with *Chain Reduction Propeller Drive.*

1913—*First Federal Aircraft Registration and Licensing* bill introduced in the Senate by Penrose.

1914—*First Passenger Airline* began business on January 1st, operating between Tampa and St. Petersburg, Fla., P. E. Fansler, manager, and Tony Janus, pilot.

1914—*Federal Regulation* of seaplanes, considered as vessels, put into force under opinion of the solicitor of the Department of Commerce. First Federal license issued to Tony Janus, flying the Tampa-St. Petersburg airline.

1914—*"X" Engine* built by W. Starling Burgess at White automobile plant.

1914—Sperry *Automatic Pilot* won the French $10,000 safety prize on July 2, as the conclusion of a series of flight demonstrations here and abroad begun the year before.

STOP AND PAY TOLL

(*Continued from page* 44)

The silliness of this sort of thing is so constitutional to human nature that it seems nearly impossible to do anything about it. But the world do move, and little by little the barriers between neighbors have been taken down. Not so very long ago every city of consequence in continental Europe demanded its own taxes of all that came in and much that went out of its limits, but that picayune policy is nearly vanished now into past history. But there are still an incredible lot of difficulties on national frontiers over there and the airplane is afflicted with most of them.

There are customs duties, permits, passports, visas, differences in language, money, postage and systems of measurement. You can't even trust the multiplication table as you travel through Europe in search of a liberal education.. And, therefore, when I read now and then in the newspapers that there is to be a United States of Europe just as soon as somebody can be found to write a constitution for it, I don't believe it. If nations can live next door to each other for centuries and fail to agree on a matter of postage stamps and the correct change for a dollar bill, I don't see how they can ever make the sacrifices and concessions necessary to make a federation of Europe. The United States of Europe makes a good talking point for Democrats who don't care for the latest model tariff bill, but it won't work until the barbed-wire entanglements of red tape and official irritations are taken down along the Old World frontiers.

But the airplane is doing its bit to promote a broader and more sensible spirit by emphasizing the absurdity of some of these handicaps to free travel. Communications by air are a living and daily argument against the insularity and jealousies of excessive nationalism. The business airplane and the business man who travels in it are not much interested in the spite fences which nations sometimes set up on their borders to keep their respective peoples from discovering that they are neighbors. Nor can the useful range of an airplane be cramped and constricted by national boundaries. Captain Frank Hawks has just given the world a very useful lesson in this respect by taking off from Los Angeles after a moonlight breakfast and landing by daylight in New York in time for an early dinner. If the Captain had taken off from London on a similar trip and flown east by south, he would have crossed in one day nine sets of frontiers, at least six different languages, eight varieties of aerial regulations, all sorts of

(*Continued on following page*)

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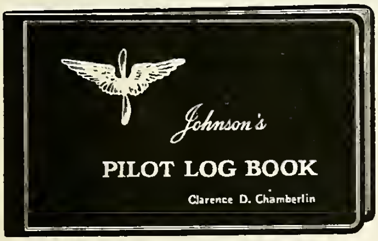

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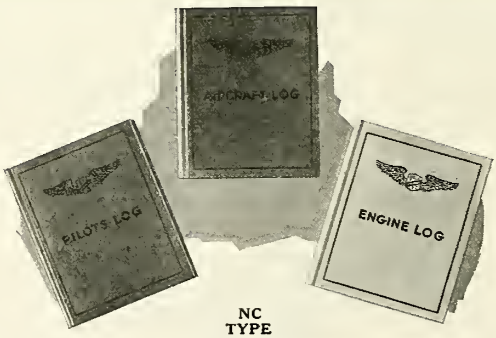

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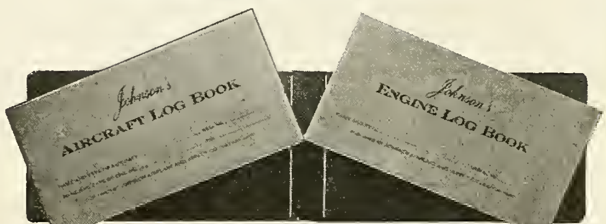

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currencies, customs barriers and varieties of opinon as to how many beans make five, and landed at last in Arabia.

The situation is very similar to that which confronted the automobile when it began to move along the American highways somewhat faster than a horse. The toll gates are becoming an infernal and even dangerous nuisance. The mere fact that there is very little sense to them would never be enough to put them out of business. But when they get in the way of quick communications, the world of business becomes impatient of them and eventually puts them out of business or reduces them to the minimum of necessity. This will happen even in Europe, though the die-hard disposition of the old national spirit will delay it as long as it dares. But already the customs regulations of some countries are being lightened for the sake of air travel and there are some few agreements among the nations on matters of air law. May their number increase! The airplane can never be as patient as the automobile with any system which makes the left side of the road correct in some countries and the right in others.

Aviation, in fact, must stick to its original idea that the air is free, or as nearly so as anything can be in a civilization which reckons that everything has its price. The freedom of the air is a matter which is still due for a lot of delicate international discussion. A nice case for debate can be found in the South Atlantic. If you have ever tried to fly the South Atlantic, you will know that the Azores and Cape Verde Islands are a great comfort to a man who runs short of gasoline or needs his lunch. Portugal owns these way stations in the midst of so much water, and certain people in France have suggested that French capital might be combined with Portuguese ownership to arrange an absolute monopoly of air communications across that section of the globe. The point is still one for academic argument, but some day it must be settled. And if you look around the world, you will find lots of others like it.

You don't suppose that sort of thing might ever embarrass the development of aviation in this country? I don't know about that. The history of every other transportation utility contains a chapter or so concerning the struggle for monopolies, not of the utility itself but of its rights of way. It is, of course, impossible to put a fence around an airway or to shoo traffic away from a logical line of travel between one place and another. But it is possible for capital to control a strategic series of airports and landing fields, with all the essentials that go with them. There is in this possibility an excellent argument for the encouragement of municipal airports, which have lately been under fire from those who think that private ownership is better, more efficient and usually more profitable. The air must be kept reasonably free, and some day the industry may need to fight for its life against the tendency of local interests to tie up the airways.

The only healthy competition in aviation is a competition in service, safety and convenience, and not in a struggle for profitable franchises or their aerial equivalent. Some day the Federal Government may need to lay down the law on this matter and put into writing what is already obvious —that the air should be free, subject to reasonable regulation by disinterested authority. Otherwise something very much like the old toll-gate system will invade aviation and cut down its speed like a combination of head winds and second hand spark plugs.

But in the meantime, there are plenty of invisible obstructions to air traffic which are taking an unreckoned toll of its progress. Most of them are a matter of inconsistency

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and uncertainty in law, of lack of regulation in some states and too much of it in others, of rules without enforcement and crimes without penalties, of interference with aviation by those who know nothing about it, and of a lack of sensible coöperation within the industry. That's why Colonel Charles Lindbergh, the well-known flier and father who has just managed to collect from Congress the medal awarded to him two years ago, has lately been saying in sundry places that uniformity in air regulations is the most important problem at present before the aeronautical world. He foresees that without it the industry will soon be falling over its own feet and tangling in its own suspenders. It's no easy problem, for it is well known that nobody has even devised a traffic code and control system for city traffic which will survive much longer than a single administration, but the effort of the interested parties should certainly be toward simplicity, uniformity and the sort of good sense which satisfies all sorts and conditions of men. We need such agreements just now particularly in developing air communications with South America, where a lot of fruity business is waiting for us, but we need it nearly as much in some of the backward Eastern states of this country.

I would modestly suggest that when the world committee is finally appointed to formulate, promulgate and perpetrate an international code of the air, it should be made up of experts rather than prominent people. It seems particularly desirable that there should be no mayors of American cities on it. Within the past month or so I have wept to hear of the mayor of a great metropolis recommending a city ordinance to forbid flying at less than 500 feet above the downtown shopping districts. I cried bitterly when another recommended a ruling against pilots flying headlong into thunderstorms and being killed within city limits. Another has lately solved the problem of dangerous flying above the chimney tops by appointing an elaborate police patrol to fly back and forth above his city and see that nobody else does. And in a little town in the Middle West there was actually passed a resolution of council forbidding aircraft to land at a speed "dangerous to ordinary wheeled traffic."

The formulation of a code which will be just as good on a back-yard airport in one country as on a great field in another is a job for experts. But it will be done some day, principally because it must be done. Aviation will not stay inside the fence lines of the world's former habits. The ship that flies must be free to go wherever there is air, which takes in a lot of territory. The rules of good behavior that are written for it must be made, as far as possible, uniform and consistent like the air itself. Unless this is done, the world's airways will be as tangled and troubled as a nation's railroads trying to do business on several track gauges and as many different signal and safety systems.

So it is quite an immediate and important problem to take down the toll gates. They are not yet taking toll in dollars or cents, or shillings, kopecks, francs, pfennigs, roubles or Chinese laundry checks. But they are taking heavy toll in time, irritation, and the discouragement of rapid transit by air; in some quarters they are taking serious toll in public safety. It should be easy to get rid of them now; later they may be fortified by tradition and by local and national obstinacy. The peoples of the earth should get together soon and open the highways of the air, making them free as may be to the commerce which is everybody's business. Otherwise the airplane is still too much tied to earth, which doesn't suit its style.

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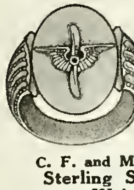

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YOUNG MAN, age twenty-three; two years college, four years newspaper work; would like position at some established airport to work and learn fundamentals so as to later secure position as airport manager. AERO DIGEST, Box 977.

ARMY TRAINED pilot, fifty hours, offers services for expenses until transport license is secured. Will then work for reasonable compensation. V. T. Ward, care Southern Pacific, Palestine, Texas.

TRANSPORT PILOT, graduate of Parks Air College, wishes position. Will go any where. 1A and IIC ratings. Noel Clark, P. O. Box 62, Marlboro, New York.

POSITION WANTED: Intelligent, well educated young man, 25 yeas old, desires financial assistance in procuring aviation training with accredited school. Address AERO DIGEST, Box 979.

YOUNG MAN desires position with flying circus or barnstormer, as wing walker or parachute jumper, for salary or flying instruction. Age 19. W. W. Wattles, Box 293, Sunnyside, Washington.

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TRANSPORT PILOT: Open and closed rating, single, age 24, wants permanent work. Now employed. Nearly five hundred hours barnstorming. No accidents; good references. Aero Digest, Box 984.

TRANSPORT PILOT: Age 31, married; two years barnstorming and cross country experience in 13 states. Clean record; best references. Desires position and will go anywhere. Address G. M. Smith, 381 West Main Street, Zanesville, Ohio.

YOUNG MAN with limited commercial license desires position in aviation. Willing to work hard and go anywhere; good references. Lockwood T. Reed, Vergennes, Vt.

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PARACHUTES: Seat, back, lap and chest, bought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonists furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Illinois. Established 1903.

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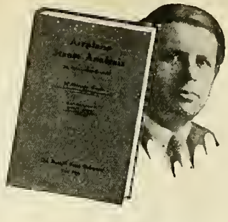

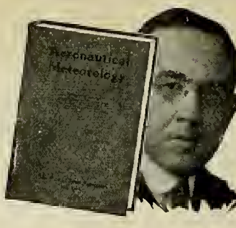


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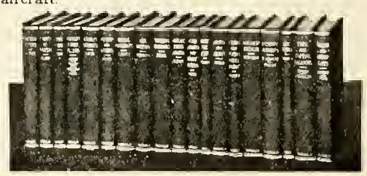

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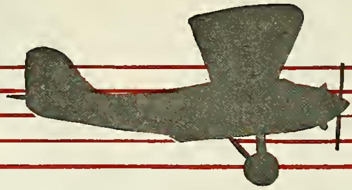

YEARS · 1928 · 1929 · 1930 WON EVERY CROSS CLOSED COURSE EVENT BOTH FOR *Cabin and* *National Air Races* · · ·

judgment of the pilots Scarab powered planes 73% of the Prize Money which they were eligible

Henry J
Little J
M no p

R T Stub
Quimby
Monocoupe

ra Daw Wa ker
Inland

G adys O'Donnell
M n cupe

rl R wl d
na

W. G. Moore
Inland

Warner-powered 1930 National Air Races

Certificate planes)

Cabin Type Planes
450 max. cu. in.
1st Vern Roberts, Warner-Monocoupe
2nd John Livingston, Warner-Monocoupe
3rd R. T. (Stub) Quimby, Warner-Monocoupe
650 max. cu. in.
1st Vern Roberts, Warner-Monocoupe
800 max. cu. in.
1st Vern Roberts, Warner-Monocoupe
2nd John Livingston, Warner-Monocoupe
3rd R. T. Quimby, Warner-Monocoupe

Open Type Planes
450 max. cu. in.
1st W. G. Moore, Warner-Inland Sport
650 max. cu. in.
1st W. A. Ong, Warner-Inland Sport
2nd W. G. Moore, Warner-Inland Sport

Sportsman Pilot Race
Open Type Plane—450 max. cu. in.
1st A. Hardgrave, Warner-Inland Sport
2nd W. G. Houston, Warner-Inland Sport
3rd M. C. Meigs, Warner-Inland Sport

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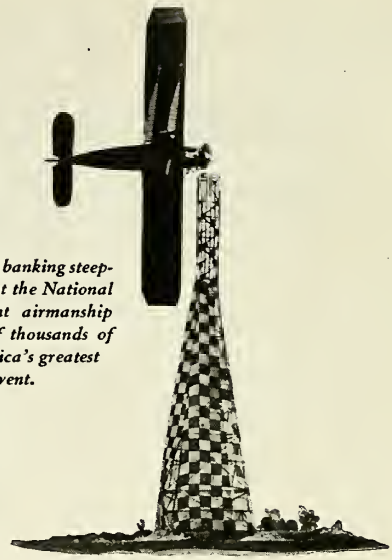
AIR RACES . . . ITS PROMISE



A commercial plane banking steeply around a pylon at the National Air Races. Brilliant airmanship thrilled hundreds of thousands of spectators at America's greatest aviation event.

EVENT No. 6—Men's (275 Cu. In. Displ.) Cabin Ship Race

1	Bart Stevenson	Monocoupe	Lambert
2	C. B. Burmood	Monocoupe	Lambert
3	J. H. Livingston	Monocoupe	Lambert

EVENT No. 7—Men's (275 Cu. In. Displ.) Free for All

1	E. B. Heath	Cannon Ball	Heath
2	Bart Stevenson	Monocoupe	Lambert

EVENT No. 10—Men's (OX5) Open Ship Race

1	Art Chester	Travel Air	Curtiss
2	Herman Hamer	Travel Air	Curtiss

EVENT No. 12—Men's (350 Cu. In. Displ.) Open Ship Race

1	Chas. W. Meyers	Great Lakes	Cirrus
2	W. S. Green	Inland Sport	Cirrus
3	B. W. Diggle	Inland Sport	LeBlond

EVENT No. 13—Men's (350 Cu. In. Displ.) Cabin Ship Race

1	Vernon L. Roberts	Monocoupe	Lambert
3	Bart Stevenson	Monocoupe	Lambert

EVENT No. 14—Men's (350 Cu. In. Displ.) Free for All

1	Ben O. Howard	Howard	Gypsy
2	E. Z. Newson	Commandaire	Cirrus
3	J. R. Wedell	Wedell Williams	Cirrus

EVENT No. 15—Men's (450 Cu. In. Displ.) Open Ship Race

1	W. G. Moore	Inland Sport	Warner
2	Leslie Bowman	Waco F	Kinner
3	Chas. W. Meyers	Great Lakes	Cirrus

EVENT No. 16—Men's (450 Cu. In. Displ.) Cabin Ship Race

1	Vernon L. Roberts	Monocoupe	Warner
2	J. H. Livingston	Monocoupe	Warner
3	R. T. Quinby	Monocoupe	Warner

EVENT No. 17—Men's (450 Cu. In. Displ.) Free for All

1	Ben O. Howard	Howard	Gypsy
2	William A. Ong	Cessna	Warner
3	E. Z. Newson	Commandaire	Cirrus

EVENT No. 18—Men's (650 Cu. In. Displ.) Open Ship Race

1	William A. Ong	Inland Sport	Warner
2	W. G. Moore	Inland Sport	Warner
3	J. B. Story	Ken-Royce	Continental

EVENT No. 19—Men's (650 Cu. In. Displ.) Cabin Ship Race

1	Vernon L. Roberts	Monocoupe	Warner
2	Leslie Bowman	Monocoupe	Kinner
3	R. T. Quinby	Monocoupe	Warner

EVENT No. 20—Men's (650 Cu. In. Displ.) Free for All

1	Ben O. Howard	Howard	Gypsy
2	William A. Ong	Cessna	Warner
3	E. Z. Newson	Commandaire	Cirrus

EVENT No. 22—Men's (800 Cu. In. Displ.) Open Ship Race

1	Lloyd O'Donnell	Waco 10	Wright J-6-7
2	A. J. Davis	Waco 10	Wright J-6-7
3	A. W. Killips	Waco 10	Wright J-5

EVENT No. 23—Men's (800 Cu. In. Displ.) Cabin Ship Race

1	Vernon L. Roberts	Monocoupe	Warner
2	J. H. Livingston	Monocoupe	Warner
3	R. T. Quinby	Monocoupe	Warner

EVENT No. 24—Men's (800 Cu. In. Displ.) Free for All

1	Ben O. Howard	Howard	Gypsy
2	Errett Williams	Wedell Williams	Wright J-6
3	William A. Ong	Cessna	Warner

EVENT No. 27—Men's (1000 Cu. In. Displ.) Cabin Ship Race

2	George L. Harte	Cessna	Wright 300
3	George W. Haldeman	Bellanca	Wright J-6-7

EVENT No. 28—Men's (1000 Cu. In. Displ.) Free for All

1	Ben O. Howard	Howard	Gypsy
2	Errett Williams	Wedell Williams	Wright J-6-7
3	George L. Harte	Cessna	Wright 300

EVENT No. 29—Air Transport Race—SPEED

2	Harold Young	Pacemaker	Wright J-6
3	George Haldeman	Airbus	Conqueror

EVENT No. 29—Air Transport Race—EFFICIENCY

1	Harold Young	Pacemaker	Wright J-6
2	George Haldeman	Airbus	Conqueror
3	Stewart Chadwick	Bellanca	Wright J-5

EVENT No. 30—Men's Multi-motored Open or Cabin Ship Race

1	Leroy Manning	Ford	Wasp

EVENT No. 32—Men's (Thompson Trophy) Free for All

3	Ben O. Howard	Howard	Gypsy
4	Paul T. Adams	Travel Air	Wright J-6-9

EVENT No. 32A—Women's (Mrs. R. McCormick Trophy) Free for All

1	Gladys O'Donnell	Waco	Wright J-6-7
3	Opal Kunz	Travel Air	Wright 300
4	Margery Doig	Pitcairn	Wright J-6-7
5	Phoebe F. Omlie	Monocoupe	Warner

EVENT No. 34—Women's (800 Cu. In. Displ.) Open Ship Race

1	Gladys O'Donnell	Waco	Wright J-6-7
2	Margery Doig	Pitcairn	Wright J-6
3	Mildred Morgan	Travel Air	Wright J-5

EVENT No. 35—Women's (800 Cu. In. Displ.) Cabin Ship Race

1	Phoebe F. Omlie	Monocoupe	Warner
2	Gladys O'Donnell	Monocoupe	Warner

EVENT No. 39—Cabin Ship Race—SPEED

1	Vernon L. Roberts	Monocoupe	Warner
2	R. T. Quinby	Monocoupe	Warner
3	Bart Stevenson	Monocoupe	Lambert

EVENT No. 39—Cabin Ship Race—EFFICIENCY

1	Stewart Chadwick	Bellanca	Wright J-5
2	Bart Stevenson	Monocoupe	Lambert
3	C. B. Burmood	Monocoupe	Lambert

EVENT No. 41—Sportsman Pilot's (450 Cu. In. Displ.) Open Ship Race

1	A. Hardgrave	Inland Sport	Warner
2	W. G. Houston	Inland Sport	Warner
3	M. C. Meigs	Inland Sport	Warner

EVENT No. 42—Sportsman Pilot's (650 Cu. In. Displ.) Open Ship Race

1	C. B. Allen	Ken-Royce	Continental A70
2	Hoot Gibson	Swallow	Axelson
3	C. B. Burmood	Monocoupe	Lambert

EVENT No. 46A—Amphibian Race

1	Arthur Caperton	Sikorsky	Wasp

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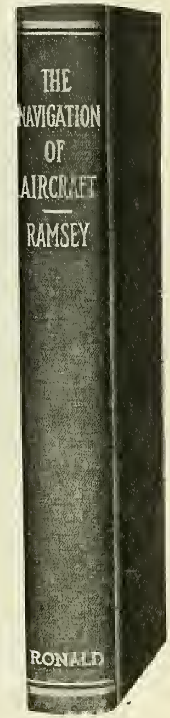

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Part five contains 65 pages and covers aerial astronomy and celestial observation, or determination of position by the aid of sun, moon, stars and planets.

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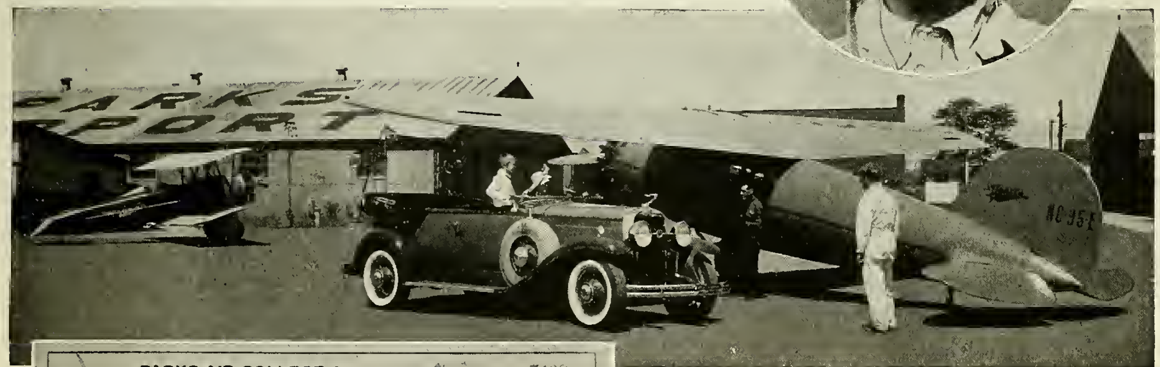
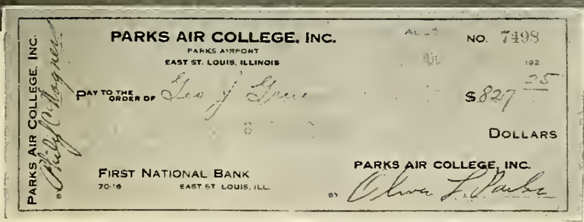
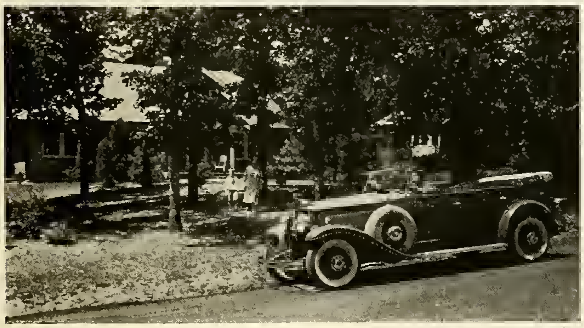
ANOTHER PARKS TRAINED STUDENT MAKES GOOD

The Story of George J. Gruen





We don't say that every *Parks graduate gets a check like this monthly. We* do *say that the chances are better than in many professions and trades*



Three years ago George Gruen was a musician earning approximately $60 per week. Today, he owns a fine home in a St. Louis suburb.

Parks training increases his pay from $240 to $827

George Gruen was not an "exceptional" student in fact it was perseverance rather than "spark" that put him over. He is a splendid example of the kind of training a man gets at Parks. And he is, also, a splendid example of the kind of a job a Parks-trained man is fitted to fill.

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All entries in Non-Stop Derby "Wasp" and "Hornet" powered

"Wasp" carries Wiley Post—winner—Los Angeles to Chicago in 9 hours, 9 minutes, 4 seconds. Others finish full throttle grind within 49 minutes elapsed time.

Wiley Post, winner of the Los Angeles-Chicago Derby, stepping out of his Wasp-powered Lockheed at Chicago. (P. & A. Photo)

Left to right, Roscoe Turner, Lee Shoenhair, Billy Brock, Art Goebel and Wiley Post, who flew their Pratt & Whitney-powered Lockheeds at an average of 184 miles an hour. (P. & A. Photo)

Record of Non-Stop Derby Los Angeles to Chicago

		Pilot	Elapsed Time	Engine
No. 11 — Lockheed	First	Wiley Post	9:09:04	WASP
No. 62 — Lockheed	Second	Art Goebel	9:21:21.4	WASP
No. 6 — Lockheed	Third	Lee Shoenhair	9:39:17	WASP
No. 12 — Lockheed	Fourth	Billy Brock	9:53:57	WASP
No. 25 — Lockheed	Fifth	Roscoe Turner	9:58:41	HORNET

Perhaps no more convincing demonstration of consistent high speed airplane engine performance has ever been made than in the National Air Race Non-Stop Derby when five Pratt & Whitney powered Lockheed planes were flown from Los Angeles to Chicago at full throttle for some 1760 miles—at an average speed of 184 miles per hour.

Los Angeles to Chicago in 549 minutes! That was the winner's time—an average of 192 miles per hour. The elapsed time of the other contestants checked within 49 minutes. Such a record spells unquestionable reliability and is a supreme tribute to pilots, planes and dependable engine power. With their engines turning well over 2100 r.p.m. all five planes reached their destination with time table regularity.

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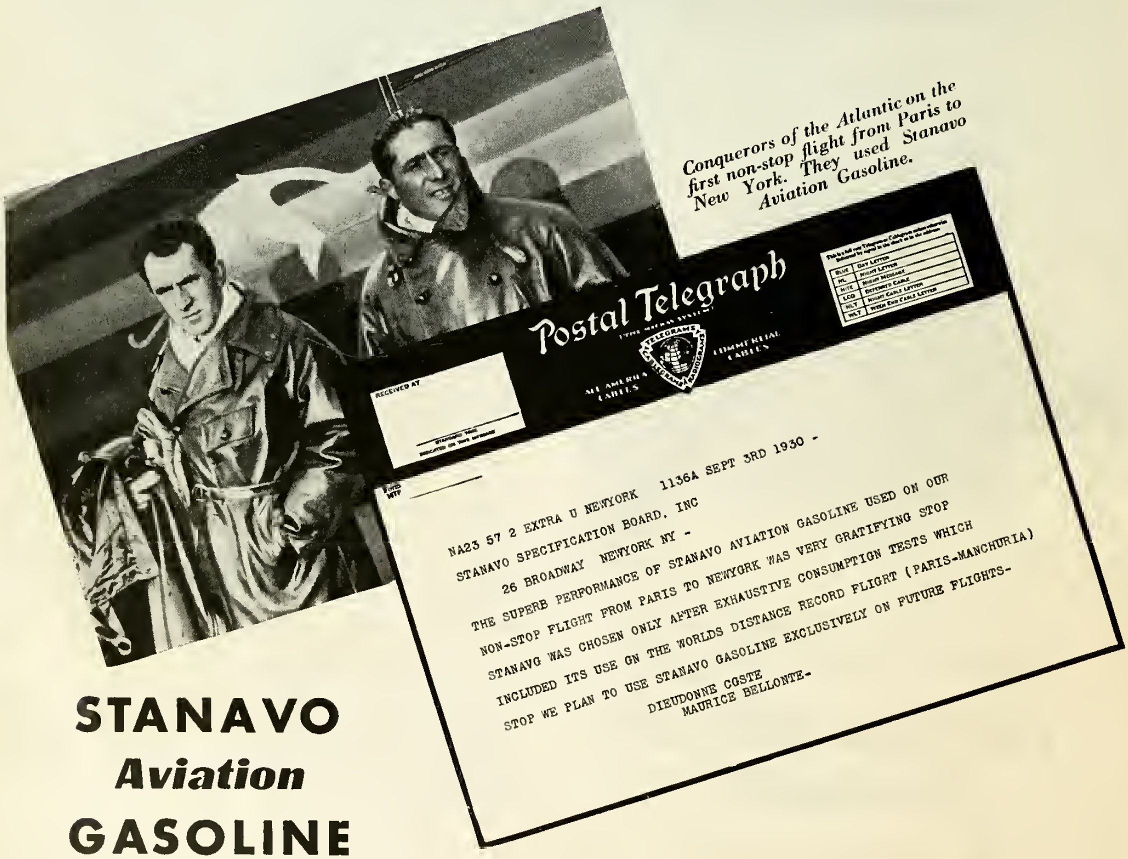

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CHARLES "SPEED" HOLMAN

captures the 1930 speed classic with
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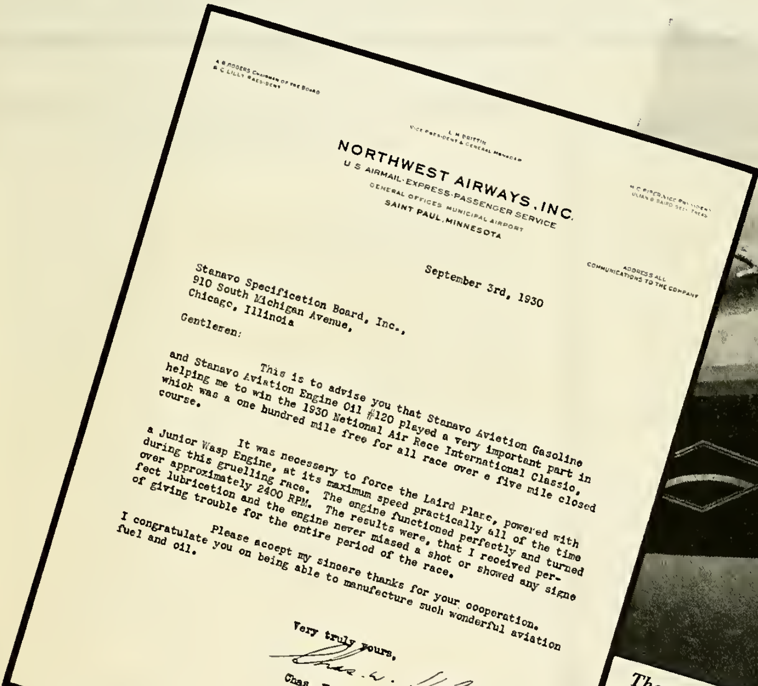

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September 3rd, 1930

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Gentlemen:

This is to advise you that Stanavo Aviation Gasoline and Stanavo Aviation Engine Oil #120 played a very important part in helping me to win the 1930 National Air Race International Classic, which was a one hundred mile free for all race over a five mile closed course.

It was necessary to force the Laird Plane, powered with a Junior Wasp Engine, at its maximum speed practically all of the time during this gruelling race. The engine functioned perfectly and turned over approximately 2400 RPM. The results were, that I received perfect lubrication and the engine never missed a shot or showed any signs of giving trouble for the entire period of the race.

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Chas. W. Holman

Chas. W. Holman

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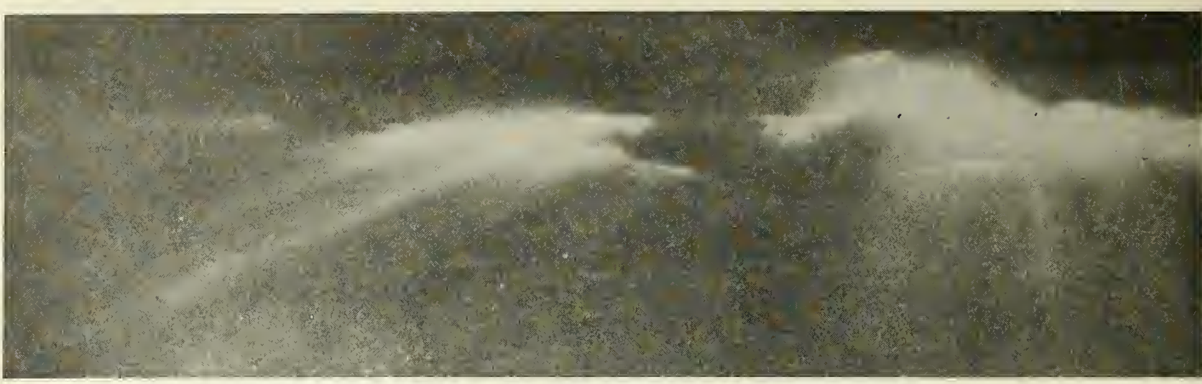
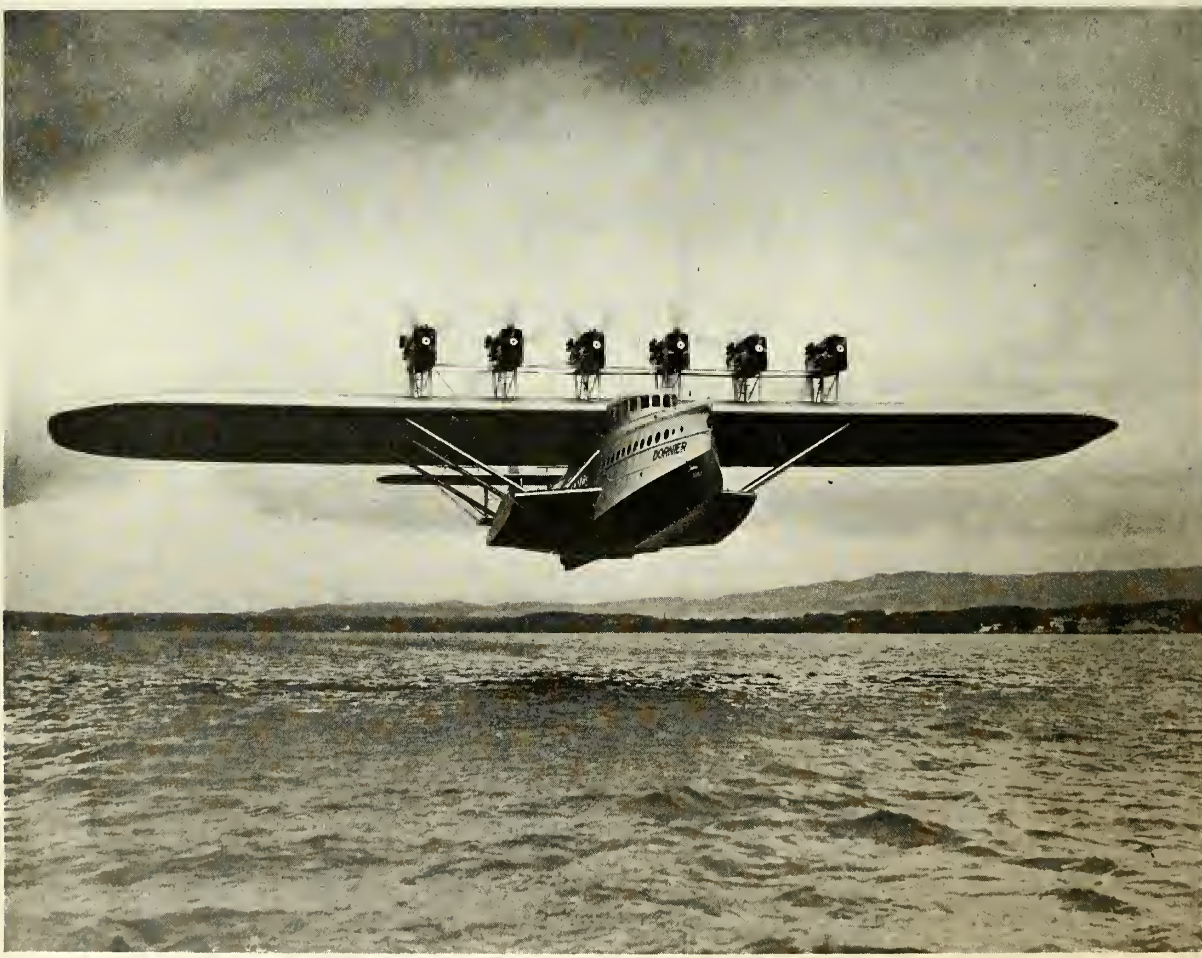
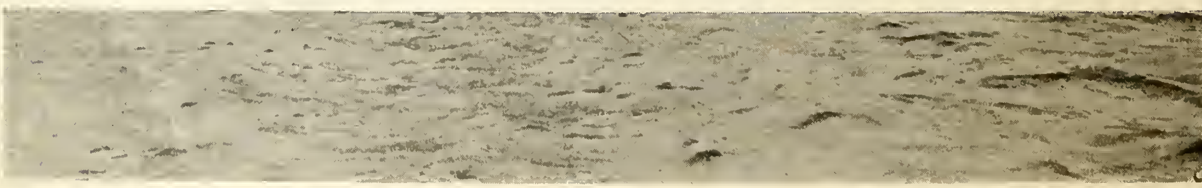
Cover design: Laird Speedwing "Solution" winner of the Thompson Trophy at Chicago Air Races



Increasing knowledge of weather conditions, especially in the upper regions, is helping toward the solution of the flying problem

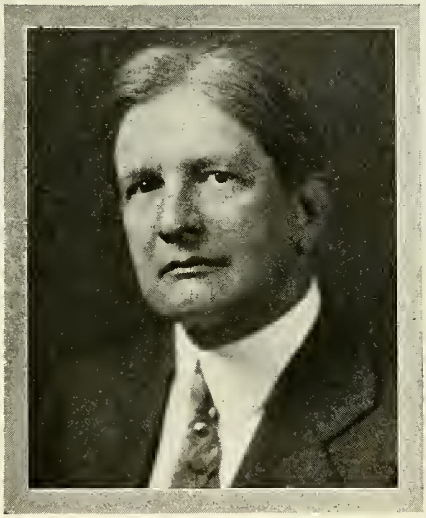


Trans-ocean airlines will join the networks covering the land areas. This view shows the newest Curtiss-powered Dornier flying ship being test flown in preparation for the proposed flight across the Atlantic Ocean



TRANS-ATLANTIC WEATHER

By Dr. James H. Kimball
Meteorologist, New York Weather Bureau



WITHOUT the aid of Dr. James H. Kimball, meteorologist of the New York Weather Bureau, most of successful trans-Atlantic flights would never have been made. Every pilot who reached his destination abided by his forecasts. Major Dieudonne Coste credited Dr. Kimball's aid as one of the principal factors contributing to the successful completion of his Paris-New York flight. Col. Lindbergh and others who have spanned the Atlantic have stressed the importance of Dr. Kimball's contributions in their accomplishments. Moreover, they have a warm personal regard for the man who has worked so unselfishly and tirelessly in their behalf.

For fifteen years Dr. Kimball studied ocean flying as a hobby. About four years ago he began active assistance to trans-Atlantic fliers by supplying weather information on conditions over the ocean. Since that time, his voluntary aid in exhaustive study of Atlantic weather, selecting the best time for the take-off and accurately predicting conditions that would occur within the following forty-eight hours, has been one of the outstanding contributions to aerial navigation.

THE science of meteorology in relation to aviation differs in one important essential from almost every other field of research that has in the past, is now and will in the future contribute to the advance of flying. Man is slowly but steadily drawing an increasing utility from the forces of nature. The shallow observer is inclined to talk and write about man's conquest of these forces, and carrying the rash use of words a little further, he frequently uses the phrase "conquest of gravity." As I see it, man has conquered neither the air nor gravity. He is merely learning a little more about these forces and is utilizing them to greater advantage. This is the task of the meteorologist. He is trying to acquire a little more knowledge each day about the weather in order to help in the great work, to which many have put their minds and shoulders, of making flying safer and more useful.

His brother workers in this absorbing field—the designer, the worker in metals, the stress analysis expert, the student of the chemistry of oils, fuels and combustion—have a stimulus that is perhaps lacking in the field of meteorology. Each year they see the products of their laboratories and drafting rooms perform a little more efficiently. The designer sees tangible results in slower landing speeds, bigger loads per square foot of wing surface, greater speeds, better maneuverability, increased stability, and, as a result of all these factors, safer and more useful aircraft. The builder of engines in the last ten years has seen extraordinary progress as the result of his work. Horsepower per pound of engine weight has steadily increased, and the dependability of motors has about reached the point where it is safe to assert that an engine never stops because of inherent mechanical weakness. These refueling duration flights offer much evidence to substantiate this statement. The instrument makers are steadily refining their products and inventing new appliances as they move steadily along their path, which is leading inevitably to the point at which human fallibility will be replaced by mechanical dependability. Closely akin to the art of designing and building flying instruments is the science of radio which has already given the pilot eyes and ears in fog, storm and darkness, and which bids fair to offer the greatest single contribution to safety in bad weather.

The weather man doesn't ever expect to see better weather as he sits surrounded by his anemometers, thermometers and barometers, his charts and reports from far distant stations, and his records of the path of storms and the limits of temperatures in years past. He knows that he will never exercise control over this weather, but he also knows as surely as his neighbors in the physics and chemical laboratories that his increasing knowledge of conditions, not only directly over the earth, but especially in the upper regions, is helping toward the solution of the general flying problem.

In his broadcast early in August, Colonel Charles A. Lindbergh predicted that the day is not far distant when trans-oceanic airlines would join together the fast-growing networks covering the land areas. When that day comes, the weather reporting service over the North Atlantic will be as complete as that which we now have over the continent. As a matter of fact, we have today an exceedingly fine groundwork for a most complete weather service over the oceans. It began hundreds of years ago. When the Cabots sailed to find the northwest passage, they kept logs for those who should sail after them. Slowly, but steadily and methodically, the ancient mariners accumulated data which replaced the fanciful legends of sea serpents and oceans with waves a thousand feet high. Those old sailing masters were not only seeking new lands; they were the forerunners of our present-day meteorologists and aviators. They considered the wind and the upper air. They studied the clouds and learned by painful experience and daring experiment when the storms could be expected, from what direction they would come and how long they might be expected to last. They learned these things remarkably accurately for observers without instruments such as we have today.

They were succeeded by others, the Yankee clipper masters and the whaling ships that sailed from Antarctic to the Arctic and returned with their loads of sperm and oil and whalebone, their yarns of far places and their precious logs for those who would go out again. They were good weather men. They had to be to work their little vessels or their great windjammers back and forth across the oceans.

As each one added his little to the general store of knowledge, seafarers began to learn what to expect in the way of winds and storm. They learned that the prevailing wind over the North Atlantic was westerly. They discovered the trades, those constant winds that blow from the northeast near Latitude thirty degrees north and from the southeast in the region of Latitude thirty degrees south, and they took advantage of them.

Following the mariners in sail came the navigators in steam, and as commerce quickened, more was learned about the weather and more was added to the growing

records, until today every pilot who prepares for an ocean flight—if he prepares at all well—is under the greatest obligation to the sturdy men who navigated the seas years before him.

Dr. Eckener is an outstanding example of the modern navigator who would take advantage especially of the trades, and the so-called anti-trades that blow in the opposite direction (so the theory holds) high above the trade winds. Just before his recent triangular cruise to South and North America, Dr. Eckener stated that he wanted to explore the upper air in the region of the trades of the Northern Hemisphere to learn if the winds there would be of help in east-to-west air transport. It is a tantalizing theory, although in view of the present limitations of both lighter- and heavier-than-air, it does not appear yet as anything more than an interesting scientific investigation.

Starting then with the careful, and for the most part accurate, research of centuries of sailor men, about four years ago the first definite step toward acquiring a North Atlantic flying weather service was taken. The backers of the ill-fated Fonck trans-Atlantic expedition arranged through the Radio Corporation of America for the collection of weather reports from ships at sea. As they arrived, these reports were forwarded to the Weather Bureau, and from them and our own weather reports and observations of local conditions, it was possible to create a fairly accurate chart of conditions over the ocean. It was also possible to indicate something of the probable conditions from twenty-four to thirty-six hours ahead—enough for the purposes of a controlled ocean flight. With the crash of the overloaded Fonck plane, that expedition ended in a fatal bonfire at the end of Roosevelt Field.

Next, Commander Noel Davis began his preparations with the *American Legion*. For six months he made an intensive study of daily Atlantic maps that had been built up from notes taken from the logs of ships. The period covered several successive years and included every known type of storm. He followed painstakingly the paths of many storms, gauged their intensity and finally reached the conclusion that it was reasonable to look for fairly good flying weather as early as May. That decision made and his plans even to the selection and training of his crew and the last detail of equipping his expedition finished, he picked up the weather service dropped by the Fonck expedition the year before. Then came his death in a training ship crash.

Admiral Byrd, with even greater attention to detail and his own personal weather expert in Mr. Roswell Barrett, picked up the service. The Radio Corporation collected the messages. Many skippers and navigators on the North Atlantic with radio sets became volunteer observers of flying conditions. They sent dozens of messages, telling of wind direction and velocity, barometric and temperature conditions, visibility, ceiling, et cetera. As fast as they came these reports were sent to us, and we were able to draw a skeleton map indicating the principal aids and hazards that a flier might expect to find along his proposed route.

Our observers were all highly trained and veteran men of the sea. Meteorology was part of their routine tasks, and the fliers were the beneficiaries of this extraordinary

(*Continued on page* 144)

The above map of the North Atlantic Ocean, September 25, shows weather as good as can be expected for a west-to-east flight. There is a moderate following wind on the great circle and steamer routes. Cloudiness is mostly broken; fog is probably thin and local, and the temperature is above freezing in usual flying levels

CYDE-LIGHTS ON THE RACES

By

Cy Caldwell

WELL, folks, I just wish you all could be sitting here enjoying the peace and quiet I'm kind of soaking in right now. I sure need it; and if you attended the National Air Races in Chicago, you need it too. I'm all worn out promoting air-mindedness, or whatever it is, among the Great American Public. I've judged races, and I've broadcast on Swanee Taylor's radio and addressed the Exchange Club and the Lions and the Rotarians, and announced over the loud-speaker system, and indulged in other forms of annoyance customary to the occasion.

And I'm all worn out. That's the pity of it. I don't mind tiring the Lions and Kiwanians and Rotarians—they ask for it and they get it—but I do object to wearing myself out. I'm an old gentleman now, needing rest, and I shouldn't have to give a speech in return for half a broiled chicken and one ear of corn made of yellow rubber. However, I shouldn't complain, for the dinners were all worth $1.25 at least—and even my best speeches have never been rated above seventy-five cents.

But I wish you could be with me now, recuperating on the beach. I just had to get this piece written for AERO DIGEST—and it's too nice a day to sit in the house to write—so I just took my old portable and walked out to Lookout Beach. I've had a swim and a sleep, and here I am with this old machine on my knees, and my pipe going. I'm facing the Atlantic, with nothing in sight between me and Europe except a big liner, away out, and a flock of sand-peeps running along the sands.

Thirty miles to the west—only thirty miles!—several million people are crowding together in New York, hurrying, pushing, sweating, working, worrying. And I'm sitting here all by myself, casually collecting a living without working for it—a truly ideal condition! Because it isn't work for me to write this little message to you six readers, although I get paid for it. I actually—of course, I know this sounds mad—I actually like to write; and if times got hard and the publisher couldn't pay me, why, I'd keep right along for the fun of it. (I wouldn't make that damaging admission, only I know my Chief is a big-hearted soul who wouldn't take advantage of my simplicity.)

But, says you, what has all this got to do with the National Air Races? Well, I'll tell you. I had a serious purpose in describing my present isolated position. Here I am, in the world, and yet comfortably detached from all its hurry and confusion. I have time to *think* about it, you see? Of course, my thoughts may be foolish, I grant you. But at least I have the leisure to think; if I had to labor all day long cooking waffles, for example, I'd have no time to think of the real meaning of a waffle.

My position in aviation is about as comfortably detached as my position in the working world is at this minute. I am, in a sense, in aviation, but not of it. Not having to fly mail for long distances or to transport passengers, or even to loop and roll, I have time to think about the business of transportation, which I wouldn't have if had to do the transporting myself, as I used to do. And it seems to me that I get a more comprehensive and a broader view of the aviation picture. When I look at the races, for instance, I don't look at them as races or stunts or formation flights alone; I look at them as one small part of a very big panorama that we know as aviation.

I have thus described my point of view because I want you to bear with me for a few serious paragraphs on these races before I jog along to the numerous Cyde-lights. What they should have is an endurance contest for those who attend the races all the ten days, as most of us did. We'd figure it on points—a sort of speed and efficiency and stamina contest. Eating a hot dog covered with mustard and dust would count ten points, for instance, while trying to get back into the grandstand with a new usher on the gate would count eighty-five. Successfully horning passes for friends who weren't entitled to them would stack up fifty points out of a total possible thousand, while listening to stray mayors and governors and other distinguished visitors would count thirty-five points for each solemn bore patiently endured. Swearing or groaning during the course of the speech would knock off eight points, and hitting or biting the speaker—as one naturally would prefer to do—would result in a disqualifying of the contestant. This endurance contest could be and, I think, should be worked out so that patient sufferers would come away from there with something besides hay fever.

* * * *

BUT here's the thought I've arrived at after watching this and five other National Air Races. And I hope that it will receive the consideration of all who have the future prosperity of aviation at heart. I've had this thought since the Los Angeles races, and have been waiting impatiently for some big shot in the industry to get it too, and spring it himself, for it would get more attention coming from him. But as the big guns have remained silent, it devolves upon the old flint-lock musket to fire off the charge. So here goes.

What, if anything, is the purpose of the National Air Races? I'll admit I've never quite discovered, though I've been given to understand that they were staged to promote aviation, to interest the public in aeronautics, to help sell airplanes and flights, to show the world new achievements in speed and efficiency generally, including reliability of equipment. In short, the races are put on to advertise our aviation wares to the public.

If that is true, we should, like all other men with something they want to sell, advertise what we have to sell. But we don't do it. Instead of advertising our business and our service, we display only the trimmings. What we have to sell is a *service*—that, and no more. The service is the rapid transportation of mail, goods and passengers about the country in time of peace, and the rapid transportation of bombs and bullets in time of war. Instead of trying to sell this service and to notify the public that we have it for sale, we deliberately, every year, put it in the background and proceed to demonstrate that aviation is, as the public suspects, merely a thrilling display of daring and personal achievement.

Now then, someone will say, "But the public will not come to see air mail and passenger planes fly tamely by; people will not come to watch Army and Navy planes sail serenely through the air. They want stunts and excitement, and if we don't supply them, they'll stay away."

But, allowing that the races are desirable—and I am convinced that they *are* desirable and that they do much

good—there is no reason other than our own lack of vision to account for the fact that we have failed, utterly, to advertise our sensible and useful business to the public, while we *have* advertised all that is sensational and dangerous.

Which is not to say that we should not display those things—for I admit that if we didn't display in that way nobody but ourselves would be in the stands. But while it may be, and I think is, a necessity to put on such a show in order to get the public out at all, why is it necessary or sensible to let them go away with the impression that what they have witnessed is AVIATION, when it is only one side, and a very unimportant side, of the whole picture of worth-while achievement?

But let me give you one little effort I made to correct this erroneous impression. At a luncheon of the National Exchange Club, I said, in part, something as follows: "You have come here to see the National Air Races, where you will be entertained and interested by races, by Army and Navy maneuvers required in war flying, by sensational stunt flying and by the display of expert airmanship. But I hope most earnestly that you will not leave here with the impression that you have seen all there is of aviation, or even that you have seen the worth-while part. All that you will see here is the sensational and spectacular.


P. & A. Photos
Groups of Navy pilots (upper view) and Army pilots at the National Air Races at Chicago

We put it on in much the same manner as a merchant might try to attract your attention by filling one show window with a trick device to arouse your interest.

"Behind all these races, behind spectacular stunts, there lies the valuable service that aviation can render to you, and to which we are merely calling attention. The National Air Races, in fact, are our aeronautical ballyhoo, put on to attract you to the goods we have for sale. Our business is to transport you, your letters, your goods, about the country faster than you or they can be transported on land. When we fly you anywhere, we don't fly you upside down; we don't loop or roll with you; we try to get you there quickly and safely.

"We have had two fatal accidents here"—and we were to have still another, unfortunately—"but neither was an accident that could happen to you in commercial aviation. One was the crash of an experimental airplane; the airplane we ask *you* to fly in is tested and proved to be safe. The other was caused by the pilot's turning the plane on its back in a position where it encountered the wash from the plane ahead, stalled, and crashed to the ground. We do not turn planes upside down with you aboard. In fact, in our airline operations we have flown more than a million and a quarter miles to every fatality. The part of aviation we invite you to use is reasonably safe."

Now, I am not suggesting that some phonograph-brained announcer should heave himself onto his feet every few minutes and recite this speech or something on the same lines—or probably the public will say with Shakespeare, "Methinks thou dost protest too much." But what I do suggest is that a start should be made at once to educate the public that there are several kinds of aviation, some safe and some spectacular, some proved and some experimental. The air races, like the automobile races, we shall have always with us. But let us make it plain to the public that these races are only vaguely related to commercial aviation; that we are trying out new and fast, and ever faster airplanes; that we are experimenting and feeling our way, sometimes uncertainly, into the future; that, in short, we are having a whale of a sporty time.

Just a word about the crashes. Those crashes demonstrated one thing—airplanes still stall. In the old days that fact used to be drummed into students, and even those of us who had achieved the glory of an instructorship believed it. I read a letter from Eddie Stinson to Major Reed Chambers in which he said ,"It's time to remind the older pilots that airplanes still can be stalled." And after the first crash at Chicago Jack Vilas and I, in discussing it, were agreed that the majority of the crashes, excluding those caused by bad weather, were due to stalls. After which we had two more stalls and two more crack-ups! Understand that I am not criticizing the flying of any one of the three pilots—everybody knows what to do with an airplane in difficulties except the poor fellow who is sitting in it! But the fact remains that those crashes were the result of stalling the plane. Fighting planes can stall upside-down very easily, especially when they fly through the down-wash of another plane; and racing planes of high wing-loading can stall quickly, even at speeds that would be high for any ordinary plane. In aviation we pay a high price for nearly everything we learn. We've paid the price with these and countless others in the past, all of which reiterate the old, old warning, *"Airplanes Do Stall."*

* * * *

THE first major problem confronting the visitor to the air races was how to get to the field. That is always a problem, and seldom is it solved to the satisfaction of all the visiting sufferers. I had easy sailing. As one of the judges, I rated a seat in an official car, and was always on hand in time to get it. The efficient and obliging Robert W. Kenworthy handled the transportation problem to the complete satisfaction of all, except possibly a few who failed to arise in time to get aboard the bus or car provided for them.

Whoever located Curtiss-Reynolds Airport certainly was determined that, before anyone got to it, he should See America First. We went right out of Chicago, through Evanston and Wilmette, and were well on our way to Wisconsin before the field hove into sight. It's completely out of range of Chicago's ruling element. The only way Al Capone will ever get it to pay tribute to him is by the use of long-distance bombers.

By the way, at future races why not one road reserved for official cars? Officials and contestants, coming and going twenty times or more during the ten days, should not be subjected to traffic delays. Coming in with Tom Hildebrandt, we were routed around by Milwaukee or Omaha. They got us shoved so far from Chicago one night that we had to come back by compass. Great explorers like

Admiral Byrd or Sir Hubert Wilkins or Shorty Cramer could lay a course for town and come in with some assurance, but the rest of us, pushed far into the hinterland by the police, felt like castaways in an open boat.

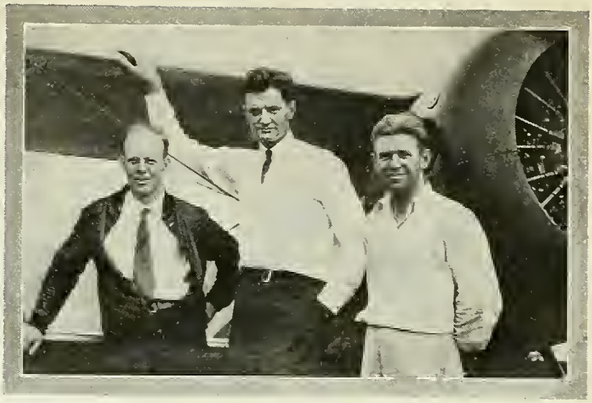
Speaking of these explorers, by the way, we've got a problem on our hands where to send them next. All the active minds in aviation have been working on it, so far with little success. The boys have used up all the likely publicity places and are wondering where to go now. Both Poles are about worn out, so far as reader interest goes, and even dog-teams are at a discount on account of Russ Owen's over-emphasizing their antics in Little America. We've had enough of dogs and enough of Poles. Of course, we're using the South Pole again, but we're shoving Wilkins down there by submarine. That lends a new note. I was talking to him about it one morning at breakfast. I said I was glad to get him off our hands for a while, but that I didn't know what to do with Byrd. He's getting restless again. And of course Shorty Cramer was born restless, and being with Sir Hubert hadn't helped him to settle down.

I complimented Sir Hubert on his whiskers and told him I thought they were good publicity. You see, those who contribute to scientific publicity expeditions are impressed by whiskers. "Here's an explorer," they say, "who knows his stuff. He's already prepared to baffle the cold. Besides, when he gets there he can breathe on it and raise his own ice cubes." Well, he's off my hands, but I've still got Byrd hanging around. He's used up most of the free lunches that were coming to him and should soon be on the prowl again. I may ship him down to Nicaragua to hunt for Maya ruins. They've had the Marines down there so long they're fed up with them. Byrd should be a pleasant change. Or I might send him over to Africa to hunt for a tribe of negroes with straight hair. But if he really wants to help humanity, he might blaze a trail between the North and South Stations in Boston. That's a thing that's never been done twice the same way.

There's one thing I missed at the races—the impressive herd of vice presidents and other high aviating dignitaries that were milling about last year. At Cleveland I was constantly tripping over them, but at Chicago they were either not present or were in the Ex class and members of that great fraternity, the Mystic Knights of Aeronautical Oblivion. Men so important they wouldn't speak to me last year actually came up and were very cordial. They'd all got human again. Incipient Harrimans and Jim Hills of the air again were reduced to my level. I could even feed them if I wanted to. There's one thing you can say for the market crash—it told a lot of us that we were only poor weak mortals after all, sons of apple-eating Adam.

I must sound the trumpet loudly in favor of the excellent flying of Phoebe Omlie and Gladys O'Donnell in the National Monocoupe Races. Those gals put the Monocoupes around the course better than the average man could do. But John H. Livingston and Verne Roberts saved the day for the men by flying the most exciting race I have ever seen, irrespective of horsepower. The way those boys jockeyed for position was a treat. Verne won, but then he's been flying Monocoupes for years, whereas Johnny has specialized on the Waco. I was betting on Verne for that reason. If the race had been in Wacos, I'd have bet on Johnny. They're about the same kind of finished racing pilots.

Mile-high Mildred Morgan circling around the course was out of sight of all except those equipped with binoculars. And Margery Doig, wandering around and looking at Chicago while she was supposed to be racing, added her bit to the enjoyment. And if Jimmy Haizlip doesn't stop dear Mae doing turns over the vertical, he's going to be faced with the necessity of picking splinters out of her. Every time Mae went around number one pylon in that Cessna, Ralph Young and C. S. Scribner and myself shuddered and called loudly on Allah. We three were taking numbers in the main judges' stand and could get a view each time of that plane turning over the vertical and slipping down. It was a disturbing sight for three old gentlemen to watch. As was the wild zoom performed by Ruth Nichols when she cut number one pylon and came close to Mae Haizlip's plane.



Matty Laird, Speed Holman and Lee Shoenhair standing in front of the Laird Speedwing, Thompson Trophy winner

Well, folks, it's getting late and about time to have another swim and tramp home. Been mighty nice here on the beach today, though I'm tapping this off under difficulties—sort of cramped holding a piece of machinery on your knees. But we all have our cross to bear, they say. Look at Captain F. M. G. Sparks, for instance. Up in Montreal they shoved a Puss Moth into his hand and told him to go to Chicago and beat any cabin plane in its class. He followed a flock of Monocoupes around, sticking patiently in last place in every race. I never saw a more persistent and game fellow. He seemed determined to get that place and hold it; if anyone dropped back, he'd drop still farther back, firm in the intention of holding last place against all comers. He said after the races that you could say one thing for the Puss Moth—the wings folded. He's a great old boy—but all Englishmen are good sports.

(*Continued on page* 152)

P. & A. Photo

Pacific Coast Derby pilots: Left to right—Roscoe Turner, Wiley Post (winner), Lee Shoenhair, Billy Brock and Art Goebel

WOMEN in the AIR RACES

By Phoebe Fairgrave Omlie

THE Women's National Air Derbies, again this year, furnished a very interesting and important element in the great Olympics of the Air.

The suggestion by the manufacturers that separate derbies be held for light and heavy ships has undoubtedly proved to be a great asset in helping to stimulate interest in the lighter aircraft, for entries in this division were much greater proportionately than in the heavier class, as compared with last year's entries.


(P&A Photo)
Mrs. Omlie (left) after arriving at Chicago, winner of the Dixie. With her is Nancy Hopkins, also an entry in the race.

The Pacific Derby, because of the greater distance of its route to Chicago, was scheduled to start several days before the Dixie Derby. As the calm ocean breezes came in from the west on that morning in August, the woman pilots entered in this race took-off one by one to try to win the second derby of its kind to start from the Pacific Coast for a Middle Western city. Gladys O'Donnell from Long Beach with a Waco, Mildred Morgan with a Travel Air, Jean LaRene with an American Eagle, Ruth Stewart in a Robin, Ruth Barron in a Buhl, and Marjorie Doig in a Pitcairn comprised the complete line-up for the race. They finished in the above mentioned positions.

At Washington a few days after the start of the other derby, the following pilots and ships lined up ready for the Dixie Derby: Martie Bowman, Kinner Fleet; Vera Walker, Warner Inland Sport; Laura Ingalls, Moth; Nancy Hopkins, Kitty Hawk; Charity Langdon, Avian; and myself in the Warner Monocoupe.

Although a slight rain was falling and a more severe storm threatening, the take-off of the Dixie Derby drew thousands to the Washington airport. After a few last-minute adjustments, the official starter gave the flag at exactly one minute past eleven o'clock on August 22. We were OFF. And what a race! Light airplanes capable of speed previously unheard of for that type of design. It was as if the greatest dreams of the engineers had, at last, been realized. "On to Richmond," the call of more than a century ago. Out over the Naval Base, Mount Vernon, the scenic Potomac, on and on—though rain and low clouds were trying their best to halt the race that would mean so much in helping to stimulate enthusiasm for aviation in the Atlantic Seaboard towns.


P. & A. Photos
Some of the women air derby fliers: Left to right—Marjorie Doig, Jean LaRene, Ruth Stewart, Ruth Barron, Gladys O'Donnell and Mildred Mogan

Just thirty-eight minutes after the start the first ship crossed the line at Richmond, having averaged more than 163 miles per hour. Here, for awhile, bad weather reports threatened to hold the race, but a long-distance call to Raleigh indicated better weather in that vicinity. Nevertheless, after starting out once more, we ran into bad storms between the two control points. Disagreeable weather, lots of rain, ceiling about a hundred feet—but it failed to halt any of the fliers.

We stopped at Raleigh overnight, enjoyed a wonderful banquet, but were grateful for orders that the reception must end at nine o'clock. We knew we could not fly well next day if we were exhausted by being entertained. The following morning a 200-mile hope to Columbia, and then to Atlanta for the night to find ourselves the recipients of warm and gracious Southern hospitality. On to Birmingham and then Memphis, where 20,000 people greeted us and made our stay delightful. Next to St. Louis and Springfield. The last day of the race found us at Elgin—and then Chicago.

Though the girls had fought bad weather, they had flown a wonderful race. Naturally they were all tired at the end, yet just a little sorry that the parting had to come. A great bunch of sports, taking their losses and gains alike. To the new ones in the industry, I say, "Welcome, we're proud of you."

The Pacific Derby wound its way in and out of the great Western Rockies, over the deserts, and then out on the Kansas plains with Gladys winning with her sturdy Waco. After a week of hard flying, they completed the second Women's air derby to start from the West Coast. The crowds at the finish hailed them as real pilots.

Even after the derbies were over, there was still plenty of activity for the girls in the closed course races.

In event number one May Haizlip, Vera Walker, Laura Ingalls, and Betty Lund lined up for the take-off. The gun, and then a wild scramble for pole position. First May Haizlip was in the lead, and then Vera Walker, but on the home stretch May outstretched Vera by several ship-lengths.

In event number two, a twenty-five-mile race for cabin ships under 500-cubic-inch displacement, three Monocoupes with Martie Bowman, Gladys O'Donnell and myself at the controls comprised the line-up. Starting toward the east Gladys and I were fighting hard for lead position at pylon number one. It was neck and neck until the cowling on Gladys' ship became loose. As a result, her ship, entry number eight, was slowed down. At the finish Monocoupe number forty-six was in the lead, with Martie Bowman and Gladys close behind.

Event number thirty-four was the race for 800-cubic-inch open ships flown by woman pilots. This race found Gladys and Marjorie Doig fighting hard for the lead, but Gladys' Waco just would not be beaten.

In event thirty-five, for (*Continued on page* 42)

OFFICIAL RESULTS OF THE NATIONAL AIR RACES

THE DERBIES

Women's Class A Pacific Derby—Long Beach, Calif., to Chicago

Gladys O'Donnell (J-6-7 Waco)............15:13:16
Mildred Morgan (J-5 Travel Air).........21:08:35
Jean LaRene (J-6-7 American Eagle).....21:45:09

Women's Class B Dixie Derby—Washington, D. C., to Chicago

Phoebe F. Omlie (Warner Monocoupe)....11:42:21
Martie Bowman (Kinner Fleet)...........14:48:39
Laura Ingalls (DH Gipsy Moth)...........16:47:26

Men's Class A Atlantic Derby—Miami, Fla., to Chicago

A. W. Killips (J-5 Waco)................11:53:23.1
A. J. Davis (J-6-7 Waco)..................11:59:40.6
G. T. Burrell (Stearman)..................14:00:07.6

Men's Class B Atlantic Derby—Hartford, Conn., to Chicago

J. Wesley Smith (Warner Monocoupe)..8:24:37.1
H. A. Little, Jr. (Warner Monosport)....8:29:29.6
C. W. Meyers (Cirrus Great Lakes).....9:04:58.1

Men's Class A Pacific Derby—Seattle, Wash., to Chicago

John Blum (J-5 Lockheed)...............18:24:31.1
Nick Mamer (J-5 Stearman).............18:47:46.4
Frank Kammer (J-5 Ryan)..............19:27:01.9

Men's Class B Pacific Derby—Brownsville, Texas, to Chicago

John H. Livingston (Warner Monocoupe).16:10:29
W. G. Moore (Warner Inland Sport)....17:28:52.1

Men's Non-Stop Derby—Los Angeles, Calif., to Chicago

Wiley Post (Wasp Lockheed)............9:09.04
Arthur Goehel (Wasp Lockheed)..........9:21:21.4
Lee Shoenhair (Wasp Lockheed).........9:39:17
William S. Brock (Wasp Lockheed).....9:53:57
Rosco Turner (Hornet Lockheed Air Ex.).9:58.41

CLOSED COURSE EVENTS

Event 1. Women's Closed Course (Open) 500 cu. in.

Mae Haizlip (Warner Inland Sport)..121.08 m.p.h.
Vera Dawn Walker (Warner Inland Sport) ....120.66 m.p.h.
Laura Ingalls (DH Gipsy Moth)......111.55 m.p.h.

Event 2. Women's Closed Course (Cabin) 500 cu. in.

Phoebe Omlie (Warner Monocoupe)..135.20 m.p.h.
Martie Bowman (Kinner Monosport)..134.01 m.p.h.
Gladys O'Donnell (Warner Monocoupe.131.91 m.p.h.

Event C. Civilians' Free-for-All (Open) 110 cu. in.

E. B. Heath (Bristol Heath)............79.13 m.p.h.
Delbert Koener (Heath Aero-Speed)...72.29 m.p.h.
G. Palmquist (Bristol Church mid-wing) 69.85 m.p.h.

Event D. U. S. Marine Closed Course

Lieut. Sanderson (Wasp Sea Hawk)...142.36 m.p.h.
Lieut. Burchard (Wasp Sea Hawk)....142.10 m.p.h.
Lieut. Kerr (Wasp Sea Hawk).........140.59 m.p.h.

Event 5. Civilian's Closed Course (Open) 275 cu. in.

Art Chester (LeBlond Davis)........112.29 m.p.h.
B. W. Diggle (LeBlond Inland Sport).108.92 m.p.h.
Fred Lund (LeBlond Davis)........... 95.53 m.p.h.

Event 6. Civilian's Closed Course (Cabin) 275 cu. in.

Bart Stevenson (Lambert Monocoupe).114.47 m.p.h.
C. B. Burmood (Lambert Monocoupe).114.11 m.p.h.
J. H. Livingston (Lambert Monocoupe).109.77 m.p.h.

Event 7. Civilians' Free-for-All (Open) 275 cu. in.

E. B. Heath (Health Cannon Ball)....118.05 m.p.h.
Bart Stevenson (Lamhert Monocupe)..115.70 m.p.h.
Danny Fowlie (Pohjoy Phantom)......115.24 m.p.h.

Events 8 and 9. U. S. Army—Closed Course

Event 10. Civilian's Closed Course (Open OX-5) 510 cu. in.

Art Chester (Travel Air).............102.10 m.p.h.
Herman Hamer (Travel Air).......... 99.80 m.p.h.
S. J. Wittman (Pheasant)............ 99.65 m.p.h.

Event 11. (Cancelled)

Event 12. Civilians' Closed Course (Open) 350 cu. in.

C. Meyers (Ensign Great Lakes)......116.93 m.p.h.
W. Sanger Green (Circus Inland Sport).110.44 m.p.h
B. W. Diggle (LeBlond Inland Sport).107.08 m.p.h.

Event 13. Civilians' Closed Course (Cabin) 350 cu. in.

Verne Roherts (Lamhert Monocoupe)..120.77 m.p.h.
F.G.M. Sparks (DH-4 Puss Moth......119.94 m.p.h.
Bart Stevenson (Lambert Monocoupe)..116.08 m.p.h.

Event 14. Civilians' Free-for-All, 350 cu. in.

Ben Howard (Gipsy Howard)........163.01 m.p.h.
E. Z. Newson (Cirrus Little Rocket).151.85 m.p.h.
J. R. Wedell (Cirrus Wedell-Williams).140.08 m.p.h.

Event 15. Civilians' Closed Course (Open) 450 cu. in.

W. G. Moore (Warner Inland Sport).128.85 m.p.h.
Les Bowman (Kinner Waco F)......118.97 m.p.h.
C. Meyer (Cirrus Great Lakes) ......116.13 m.p.h.

Event 16. Civilians' Closed Course (Cahin) 450 cu. in.

Verne Roherts (Warner Monocoupe....146.20 m.p.h.
J. H. Livingston (Warner Monocoupe).146.10 m.p.h.
R. T. Quimby (Warner Monocoupe)....139.62 m.p.h.

Event 17. Civilians' Free-for-All. 450 cu. in.

B. O. Howard (Gipsy Howard)........154.83 m.p.h.
William Ong (Warner Cessna)........145.49 m.p.h.
E. Z. Newsom (Cirrus Little Rocket).144.49 m.p.h.

Event 18. Civilians' Closed Course (Open) 650 cu. in.

M.P.H.
Wm. A. Ong (Warner Inland Sport)........129.81
W. G. Moore (Warner Inland Sport)........127.33
J. B. Story (Continental Ken-Royce)..........123.85

Event 19 Civilians' Closed Course (Cabin) 650 cu. in.

V. Roberts (Warner Sport Monocoupe).141.91 m.p.h.
Les Bowman (Kinner Monocoupe)....140.01 m.p.h.
Stub Quimby (Warner Sport M'coupe).137.34 m.p.h.

Event 20. Civilians' Free-for-All. 650 cu. in.

B. O. Howard (Gipsy Howard)......155.19 m.p.h.
William Ong (Warner Cessna)........147.83 m.p.h.
E. Z. Newsom (Cirrus Little Rocket).143.64 m.p.h.

Event 21. National Guard, Liberty Engine Builders' Trophy

Lieut. W. V. Newhall (Douglas)......129.76 m.p.h.
Lieut. C. D. Barnhill (Douglas)......129.53 m.p.h.
Maj. Phil Love (Douglas).............129.17 m.p.h.

Event 22. Civilians' Closed Course (Open) 800 cu. in.

Lloyd O'Donnell (Whirlwind Waco)..152.05 m.p.b.
Arthur J. Davis (Whirlwind Waco)....147.44 m.p.h.
Art W. Killips (J-5 Waco)............143.52 m.p.b.

Event 23. Civilians' Closed Course (Cabin) 800 cu. in.

Verne Roberts (Warner Monocoupe)..145.58 m.p.h.
John Livinston (Warner Monocoupe)..145.40 m.p.h.
R. T. Quimby (Warner Monocoupe)..140.01 m.p.h.

Event 24. Civilians' Free-for-All. 800cu. in.

B. O. Howard (Gipsy Howard)........162.43 m.p.h
E. Williams (J-6 Wedell-Williams)....161.73 m.p.h.
William Ong (Warner Cesna)...........148.25 m.p.h.

Event 25. Parachute Landing Contest

August 26 and 27.........................R. D. Rae
August 28..............................E. V. Stewart
August 29..................................Joe Crane
August 30, 31, and Sept. 1................R. D. Rae

Event 26. Civilians' Closed Course (Open) 1,000 cu. in.

J. G. Haizlin (J.6-9 low wing Travel Air) ....183.36 m.p.h.
"Speed" Holman (Wright Laird Speed-wing) ....170.72 m.p.h.
B. O. Howard (Gipsy Howard) ......159.43 m.p.h.

Event 27. Civilians' Closed Course (Cabin) 1,000 cu. in.

C. S. Jones (Wright Cesna)..........149.41 m.p.h.
G. L. Hart (Wrigbt Cesna)..........148.36 m.p.b
George Haldeman (Wright Bellanca)..136.1 m.p.h.

Event 28. Civilians' Free-for-All. 1,000 cu. in.

B. O. Howard (Gipsy Howard)........162.65 m.p.h.
E. Williams (J-6 Wedell-Williams)....159.07 m.p.h.
George Hart (Wright Cesna) ....150.09 m.p.h.

Event 29. Civilians' Air Transport (Speed) miles per hour

J. G. Haizlip (Wasp Lockheed Vega).160.90 m.p.h.
Harold Young (Wright Bellanca)......129.59 m.p.h.
George Haldeman (Conqueror Bellanca) 123.82 m.p.h.
Stewart Chadwick (Wright Bellanca)..108.54 m.p.h.

(Continued on following page)

Inside the lines at the National Air Races held in Chicago from August 24 to September 1

(Efficiency) merit points

Harold Young 626.02
George Haldeman 608.45
Stewart Chadwick 471.90
James G. Haizlip..............................359.14

Event 30. Civilians' Multi-Engine Closed Course

Leroy Manning (Ford with 3 Wasps)..144.24 m.p.h.
W. J. Fleming (tri-engined Bach)....137.44 m.p.h.

Event 31. U. S. Navy Closed Course

Lieut. D. S. Cornwell (Wasp Boeing)..127.23 m.p.h.
Lieut. Com. J. H. Campman (Wasp Boeing) ....125.69 m.p.h.
Lieut. J. P. DeShazo (Wasp Boeing).125.52 m.p.h.

Event 32. Thompson Trophy, Unlimited Free-for-All

"Speed" Holman (Wasp Junior Laird).201.91 m.p.h.
J. P. Haizlip (Whirlwind Travel Air)..199.80 m.p.h.
B. O. Howard (Gipsy Howard)........162.80 m.p.h.

Event 32-A, Women's Free-for-All, Mrs. R. McCormick's Trophy

Gladys O'Donnell (J-6-7 Waco)........149.9 m.p.h.
Mae Haizlip (Warner Cessna)..........148.42 m.p.h.
*Opal Kunz (J-6 Travel Air)...........145.76 m.p.h.

Event 33. Men's Dead Stick Landing (Daily)

Aug. 24....John H. Livingston (Warner Waco F)
Aug. 25....John Livingston (Warner Waco F)
Aug. 26................M. Hersberger (Hess Argo)
Aug. 27.............D. A. Fowlie (OX Travel Air)
Aug. 28....................R. E. Kuser (OX Waco)
Aug. 29...............Art Chester (OX Travel Air)
Aug. 30.......................Art Davis (J-6 Waco)
Aug. 31...................W. A. Krantz (Aeronca)
Sept. 1.................Don Rae (OX-5 Challenger)

Event 34. Women's Closed Course (Open) 800 cu. in.

Gladys O'Donnell (J-6-7 Waco).......139.88 m.p.h.
Margery Doig (J-6 Pitcairn)............135.26 m.p.h.
Mildred Morgan (J-5 Travel Air)......107.24 m.p.h.

Event 35. Women's Closed Course (Cabin) 800 cu. in.

Phoebe Omlie (Warner Monocoupe)..139.97 m.p.h.
Gladys O'Donnell (Warner Monocoupe) 139.84 m.p.h.
Mae Haizlip (Whirlwind Cessna)......134.71 m.p.h.

Event 36. Women's Dead Stick Landing

Aug. 28.........Charity Langdon (Whitt. Avian)
Aug. 29.........Mildred Morgan (J-5 Travel Air)
Aug. 30...............Ruth Nichols (J-6 Birdwing)
Aug. 31 and Sept. 1..........Betty Lund (Aeronca)

Ben O. Howard and the plane in which he won several races

Event 37. Balloon Bursting Contest for Men

Aug. 24 and 25—J. H. Livingston (Warner Waco) 28.1 sec.
Aug. 26—Harold Neumann (Ox-5 Travel Air) 31.1 sec.
Aug. 27—Art Chester (OX-5 Travel Air) 24.4 sec.
Aug. 28—Doug. Davis (Ox-5 Waco) 56 sec.
Aug. 29—Doug. Davis (J-6 Travel Air) 40 sec.
Aug. 30—Art Davis (J-6 Waco) 25.5 sec.
Aug. 31—J. H. Livingston (Warner Waco) 25 sec.

Event 38 Civilians' Acrobatic Exhibition

Aug. 23—Fred Lund (J-5 Waco)
Aug. 24—Fred Lund (J-5 Waco)
Aug. 25—Fred Lund (J-5 Waco)
Aug. 26—Art Davis
Aug. 27—Art Davis
Aug. 28—Steve Quimby
Aug. 29—Steve Quimby
Aug. 30—Art Killips
Aug. 31—Doug. Davis
Sept. 1—Doug Davis

Event 39. Civilian's (Cabin) (Speed) Miles Per Hour

Verne Roberts (Warner Monocoupe)....142.71 m.p.h.
Stub Quimby (Warner Monocoupe)....131.44 m.p.h.
Bart Stevenson (Lambert Monocoupe).113.76 m.p.h.
(Efficiency) Merit Points
S. Chadwick (J-5 Bellanca CH)......489.25 points
Bart Stevenson (Lambert Monocoupe) 336.15 points
C. B. Burmood (Lambert Monocoupe).323.95 points

Event 40. Sportsmen Pilots' Race, 305 cu. in. (Cancelled)

Event 41. Sportsmen Pilots' Race (Open)

A. Hardgrave (Warner Inland Sport)..119.35 m.p.h.
W. G. Houston (Warner Inland Sport.119.22 m.p.h.
M. C. Meigs (Warner Inland Sport....100.35 m.p.h.

Event 42. Sportsmen Pilots' Race (Open) 650 cu. In.

C. B. Allen (Continental Ken-Royce)..110.02 m.p.h.
Hoot Gibson (Axelson Swallow)......109.26 m.p.h.

Events 43, 44 and 45, Sportsmen Pilots' Races, 800, 1,000 and 275 cu. in (Cancelled)

WOMEN AT THE AIR RACES

(*Continued from page* 40)

800-cubic-inch cabin ships, Gladys and I were again flying like we had never flown before. With the cowling fixed in the trim little Coupe, first one of us was ahead and then the other. It was a great fight in which Monocoupes nosed out the Cessna by several hundred feet.

The free-for-all for the McCormick Trophy was flown Labor Day. This was the race which commanded greatest interest among women's closed course events, because it was open to all classes. Bad cross winds made it necessary to start at ten-second intervals instead of race horse style. Gladys O'Donnell, Opal Kuntz, Mae Haizlip, Marjorie Doig, Ruth Nichols, Mildred Morgan and I were the entries. Needless to say, Gladys took home the trophy.

Quite a number of last year's derby entrants were visitors at the races. Blanche Noyes came in for a visit the first day. Amelia Earhart and Louise Thaden, the winner of the Pacific Coast derby last year, stayed a couple of days. Claire Fahy strolled up and down the line with a wistful look in her eyes. Edith Foltz came in as passenger on one of the men's derbies. I am sure they missed being in the derbies as much as we missed having them.

One of the great disappointments to the girls was in not seeing Thea Rasche from Germany. However, Miss Strassman ably represented Thea's country instead.

Elinor Smith, although participating in no races, played an important part in Chicago by broadcasting the results of the events and setting the future styles for the girls who at the moment were really much too busy to think of them. And after all, if we are to sell aviation to women, we must make it as attractive as possible.

Miss Willhite flew all the way from South Dakota to inquire about the derbies. I'm sure next year she will be among the entrants.

The "99's" held a meeting at the Drake Hotel on Wednesday, August 27, but because of a pilot's meeting for the contestants at the field, I was unable to attend. A regular get-together was reported.

This short chat about the races would be quite incomplete if I should fail to mention the work by the local committee at the Girl Pilots' Club. It was wonderful. I am sure Peggy Rex who started the Girl Pilots' Clubs at the National Air Races last year and who was a visitor at the 1930 races could be proud of the way the girls in Chicago handled things. Not enough praise can be given to the Chicago members for thinking of everything that we girls might want, and providing it.

COMMENTS ON THE AIR RACES

COL. CLARENCE M. YOUNG

Assistant Secretary of Commerce for Aeronautics

IT is extremely unfortunate that there were fatalities. If we could foresee them, we probably would forego the events in which they occurred. But if one draws the line between race events and the normal use of airplanes, the contrast offers opportunity for the potential air traveler to realize the dependable margin of safety under normal conditions.

A parallel between the National Air Races and the annual Indianapolis speedway automobile races can be drawn, and it is logical to expect eventually that the air meet will be made the same sort of sports event that the automobile contest has become.

The automobile races occasionally are accompanied by serious accidents and fatalities, yet they are unquestionably of value to the automotive industry and have very little effect on the public in causing people to have fear of automobiles. The air races, in essence, are in the same category, and there is no doubt that in the past they have contributed to the advancement of our aircraft and our aviation.

Leading manufacturers are caused to design new planes and bring out novel types of craft for display and composition at the races, and such action leads to progress of the industry in general exactly as automobile races have been largely responsible for more substantial, more reliable, and more versatile automobiles. Performance and efficiency is considered as much as speed by these manufacturers.

Airplanes are put to extremes of performance at such events, and the successful performances indicate exactly how much progress is being made.

REAR ADMIRAL MOFFETT

Chief, Bureau of Aeronautics, Navy Department

WITH proper regulations and safeguards, the events can be arranged so that casualties will be avoided, and the fact that fatalities occurred this year should not be considered as an argument against holding such competition in the future.

The Navy follows a policy of giving every possible encouragement to commercial aeronautics, and both commercial and military aviation have been advanced by competition in this country and abroad. The races also are valuable in that they stimulate public interest.

I favor participation in the National Air Races by the Navy because of the many benefits derived. Competition leads to development of more capable planes and better engines, and the public is entitled to occasional opportunities to observe Navy planes in action because the planes belong to the public.

The development of high-speed engines resulted directly from competition between designers and manufacturers, but without such a stimulus in design, progress of this sort probably would have been much slower because of many economic considerations.

This year was the first occasion for the Navy to attribute fatal crashes directly to participation in the races. There is no doubt, however, that the normal routine flying of the Aircraft Squadrons is more hazardous than the races. Flying from carriers at sea at night is a great deal more dangerous.

MAJ. GEN. JAMES E. FECHET

Chief, U. S. Army Air Corps

THESE events encourage and stimulate civilian performance, organization and development. The bigger the field, the more interest; and there is no better way than these races to demonstrate the progress of the past year in all branches of aviation.

The Air Corps does not compete with civilian pilots or attempt to contrast the performances of its craft with commercial planes, but is watching closely the performances of civilian craft for new tendencies in design and construction. Participation of Air Corps pilots in special non-competitive events is part of the desire of the Army to assist in making the races successful.

JIMMIE DOOLITTLE

Superintendent, Aviation Division, Shell Petroleum Company

THE two primary requisites essential to the success of air transport are speed and safety. Safety is assured through proper methods of operation, intelligent use of the modern aids to navigation and the selection of a safe airplane. A safe airplane is one that is structurally sound, aerodynamically correct and has a slow landing speed.

Assuming a given landing speed, the high speed and cruising speed can be increased only through cleaning up design, increasing propeller efficiency or increasing power. In any given case the power must be increased without adding weight or the landing speed goes up accordingly.

In the present stage of our aeronautical knowledge the desirable characteristics enumerated in the preceding paragraph can be brought about only through the expenditure of time, energy and money. Racing acts as a stimulant to promote the interest necessary to this expenditure. It furnishes a popular incentive to excel; and it is through the spirit of competition, whether it be between individuals, manufacturers, military services or nations, that the improvements are brought about which each year increase the speed, safety and utility of airplanes.

R. W. (SHORTY) SCHROEDER

Manager
Curtiss-Wright Flying Service

THERE will always be aircraft races and they will be very helpful to the industry, particularly when there are prizes bigger than are being offered today.

I do not believe we are going to get any place with the National Air Races under the present method of operation, method of sanction, and the handling of the aircraft manufacturers and pilots. It is the same story every year: it is very difficult for the people who are making aviation to be able to get any place or get anything done after they arrive at the city of the races.

So far as this year's Contest Committee was concerned, we were just a bunch of boys who got together to put on the show. It took considerable effort to get even small expenses for some of the boys, and when you figure that it took something like $600,000 to stage this show, and when you realize that less than $100,000 was put up for prize money, you will also perceive that that sum was rather thinly spread so that manufacturers or pilots who won did not win anywhere near what they should have for such events.

We should have a permanent location for the National Air Races and actually conduct races instead of the small number that we conducted this year. Every year the people go to Louisville to see the horse races; it is not necessary to build a costly plant annually to conduct those races. Every year also great crowds go to Indianapolis to see the automobile races without a costly plant having to be built.

Yet at both of these aforementioned places the men who conduct the races are a seasoned group that improves each year so that today they have a real organization.

It is not my contention that the National Air Races should consist of races alone, but there should be more races and fewer of the special features. Instead of having the special features sandwiched in between the races, I believe that they could be used to fill up the end of the program. In this way the industry and its followers could come out early in the day and see their favorite races and leave if they wished before the features, and the general public, which is in the habit of being late at everything would be in plenty of time for the feature acts which are put in the program for their especial interest.

I feel that we could hold the National Air Races (or the equivalent of the National Air Races) every year in a city like Chicago under a plan wherein the bulk of the money, instead of going into promotion and building of a plant, could be used to make available bigger and better prizes.

E. B. HAINES

Assistant Sales Manager
Pratt & Whitney Aircraft Company

FROM a cursory observation, the races appeared to be a financial success to the promoters, and also tended to indicate publicly the advances which aviation is making. Several complaints were heard that the five-minute "open" intervals were insufficiently

(Continued on following page)

The various cross-country derbies flown by both men and women pilots indicated that the possibilities of consistent cross-country flights are fast reaching a stage of dependability and sureness heretofore considered doubtful. Then, the exhibitions of stunt flying brought out that man is fast learning to maintain himself in safe flight to a degree beyond what has generally been considered possible. Lastly, the speed races demonstrated the extent of progress which has been made both in ships and engines as regards fast air transportation.

All these facts about aviation presented in such a methodical and business-like manner are bound to impress the public and have a beneficial effect on aviation in general. The public is forced to realize more than ever that air transportation is something outside the elements of mystery or chanc—a substantial and dependable means of travel. This sort of publicity—and air races are nothing else—probably appeals to the public more forcibly than any other form, and because of this, it is felt that the National Air Races of 1930 have been of marked value to aviation.

A few minor details could perhaps be changed to improve conditions during such an air meet. The intervals of opening and closing the airport to flights of non-participating planes stands out as perhaps the most important respect in which the conduct of the races could be modified to advantage.

Then, the speed races this year made it very apparent that a five-mile closed course is entirely indaequate for ships flying at such speeds as those in the Thompson Trophy Race. Although the short course probably tended to increase the attendance on and around the field because its entire length was always in view of the grandstands, to fly such a course at 200 or more miles an hour is defintely unsafe. More-

DUDLEY M. STEELE

Manager, Aviation Department, Richfield Oil Corporation of California

THE 1930 National Air Races have proved again the age-old theory that experience is the best teacher. Cliff Henderson has again topped the previous races not only from the standpoint of spectators, which is of great importance, but also in the handling of every detail concerning the races. It is not conceivable that the National Air Races will ever again be handled by a green committee, selected locally for political or other reasons. The races have reached a point of magnitude where the spending of the amount of money necessary to stage them properly requires practical experience in the handling of such projects, because regardless of a man's showmanship or his executive ability, experience is the keynote. Cliff Henderson has it and with it the necessary executive ability and showmanship. The contest committee this year deserves tremendous credit for the manner in which the contests on the field were handled.

There is just one little thought that occurs to me to point out as a constructive criticism. It is that once the races have started, the responsibility of the contest committee, as well as that of the executive committce, shifts from the contestants in the race to the public which has paid admission. It is true that without pilots there will be no races, but once pilots have been interested to the extent of entering and all possible arrangements have been made for their competition, then the direction of responsibility changes and the race committee is responsible only to the multitudes who attend these races and every effort should be made to handle the races promptly on time and to make such a program as will be diversified and interesting to the crowd. There is one addition to Cliff Henderson's staff for handling the races next year, and a very important one, that should be given consideration—a permanent contest chairman. This man ought to collaborate with Cliff and to be a permanent part of his staff regardless of where the races go.

RICHARD H. DEPEW, JR.

Sales Engineer
Fairchild Airplane Manufacturing Corp.

THE Chicago National Air Races were the best managed to date and reflect the master showmanship of Cliff Henderson.

Obviously, pilots are the backbone of air races, whether or not they are actually entered in the events. The public comes to see airplanes, and the fact that hundreds of pilots fly in from all parts of the country to witness the races and bring their ships to the race field, contributes very largely to the show. I believe that in future air races a pilot's license should be the only pass he needs to admit him and give him access to the field itself. Furthermore, it should be possible for accredited representatives of manufacturers, such as members of engineering departments, production superintendents, etc., to secure passes permitting to examine closely the various airplanes.

Although it is somewhat difficult to analyze what effect such races have on the sale of airplanes, it is my opinion that they benefit the manufacturers of military equipment much more than those who produce commercial airplanes only. The events attract large crowds of spectators who come to seen something spectacular. When accidents do occur (as is nearly always the case), they are not unexpected by the spectators. The beautiful performances of the military air services show the public what these branches of the national defense are capable of doing with modern military aircaft, and very probably serve to stimulate considerable interest in this branch of flying, thus helping to justify in the minds of the public the yearly expenditures necessary for the air services. This, of course, tends to aid the manufacturers of military airplanes, motors and other equipment, and in this way is beneficial to the industry.

So far as commercial sales of airplanes are concerned, I think that such events are possibly a detriment rather than a help because the spectacular and dangerous flying engaged in scrves to emphasize to the spectators the "Coney Island thrill" idea and

FRED L. FOSTER

Manager, Department of Aviation, Richfield Oil Corp. of New York

THE National Air Races, as at present conducted, do not meet the expectations of the industry, nor do they serve the purpose for which they were originally planned.

Future National Air Races must adopt a radically changed program if they are to serve adequately as an annual exhibit of aeronautical progress. A great deal more emphasis must be placed on the development of speed in aircraft, for this is essentially aviation's chief selling point.

I feel that aviation must follow in the footsteps of the automobile industry's speed races of earlier days. It was upon the annual speed classics that the automobile industry was founded and to which it owes much of its rapid growth.

The introduction of the international element this year is certain to bring about a great change in our annual air meet. The foreign nations, given sufficient time, will participate in this "Olympiad of the Air" and will devote themselves to the development of new engine and plane types to be matched against ours. This will call for more intensive efforts upon the part of American aircraft designers and will place the emphasis where it properly belongs.

GERALD H. McCLELLAND

National Airport Engineering Co., Ltd.

THE operations cost of this year's races, as well as last year's, was entirely too great. A firm accustomed to studying economics from a production and service standpoint could cut down the operations cost of the National Air Races by thousands of dollars.

Operations for an event such as the National Air Races should be divided into two groups—contestants and visiting pilots. The contestants' headquarters should be on the opopsite side of the field from the grandstand. The contestants' stand should have been over where the Army ships were quartered in front of that "Shell Welcome" sign.

Two buses, one at the grandstand and another at the contestants' headquarters, should continually operate between the two points around the edge of the field so that it would save time and be more convenient for contestants to get to and from contestants' headquarters and at the same time be right in the midst of things, so that they might know exactly what is going on.

There is a lot to be said pro and con about ships entering into various contests—whether they should have an ATC or whether they should not. Years ago when I was playing with hoops and marbles, the F. A. I. made a ruling that advertising signs should not be carried on airplanes. This ruling was made when the only place to exhibit a sign was the rudder or the fin. Anyone will admit that aviation has progressed a long way since those F. A. I. rules were written.

ROSCOE TURNER
Pilot, Aviation Division
Gilmore Oil Company

MORE consideration should be given to the owners of the airplanes at the air races. It is these owners and the pilots who really make the event successful, and it is to the advantage of the sponsors of the races to have as many entries as possible. More planes would be entered if a little advertising were permitted on them. Advertising in this way is not offensive, and it is about all the return the owner expects for his participation, which represents an investment of his time and money. Many of these ships come to the races from long distances, indirectly advertising the races themselves as well as the product of their owners.

LEE F. SHOENHAIR
Pilot, Aviation Division
B. F. Goodrich Rubber Company

FOR at least the next five years National Air Race events should continue to be held near cities with populations of about 1,000,000. In so doing it would be possible to insure the success of these undertakings, on the basis of the past three national air shows as contrasted with the financial failures of so many of the previous meets where it was impossible to attract large crowds.

It is becoming increasingly difficult to secure proper and necessary credentials for accredited representatives to carry out their appointed tasks when the control of field passes particularly is in the hands of local committees without knowledge of the "Who's Who" in American aeronautics.

JACK WHITAKER
Sales Manager
Nicholas Beazley Airplane Co., Inc.

IT appears to me, speaking as a manufacturing member of the industry, that aside from the showmanship employed to attract and hold the public spellbound, we should have offered a demonstration of the competitive qualities of our various ships to the large number of aviators, members of the aviation fraternity and the general public also, who attend the Nation Air Races. In other words, more detailed thought should be given to developing competitive events in which the manufacturers of various classes of planes may enter their new products and standard production units for the definite purpose of proving the superiority of these crafts. Moreover, the prizes for such events should be sufficient to make the development of new types a worth-while proposition. Airplanes should be allowed to enter this type of competition with either experimental or any other form of license which will protect the competitive pilots and participants from objectionable, unsafe crafts.

Having witnessed for several years the tests imposed upon applicants for entry in the Ford Tours, I can recall no more interesting demonstration of airmanship and plane efficiency than the picturesque stick and un-stick tests used in this connection.

We should be able to develop a series of competitive events designed for commercial aircraft which will permit both picturesqueness in the conducting of these events and a definite means of determining the comparative merits of the ships entered. These should include load carrying efficiency, speed, general efficiency, stick and un-stick tests, climb, spot landing efficiency and the many other interesting standard performance tests used in determining the quality of commercial aircraft.

WALDO D. WATERMAN
Pilot and Aeronautical Engineer

THE recent National Air Races at Chicago certainly showed a vast improvement over the five previous national races which I had the opportunity to attend. The thing that impressed me greatest was the manner in which the schedule was adhered to.

More time should have been given to actual racing, however. The program put on by the foreign fliers, although interesting in its international aspect, dragged considerably after the first two or three days.

We all know that air races must provide a good show or they will be financial failures and cannot continue. In the future more time should be given to the demonstration of aviation's newer developments. Each year there are enough of these new ideas to eliminate the necessity of showing any one more than two or three days during an entire nine days' race period. It is also my belief that one or two comedy events can well be interjected into a program during the dull spots. Any attempts along this line were noticeably absent at this year's races with the exception of Captain Atcherly's excellent exhibition of "crazy" flying.

Considering the race as a whole, however, I think it was a success in all respects. Of course, the fatalities were regrettable but I doubt if any precautions on the part of the race committee could have been taken which might have eliminated any one of the regrettable accidents.

E. J. SNOW
Aviation Division, Vacuum Oil Company

THERE can be no denying that the races present a most unusual and startling spectacle. Curiosity and mass morbidity apparently grows with the square or cube of possibility of danger or disaster. The more daring the flights become, the greater and more enthusiastic will be the crowd—*but not with any idea of becoming air-minded.* An adverse reaction to enjoying and using air transport will be more likely to result. In automobile racing, the public appreciates the difference of operation by racing drivers and their own driving on public highways. With flying, a different psychology prevails. The average individual will not operate his own airplane and is apt to believe that he will experience the dangers of racing performance if he travels by air transport.

LEE WARRENDER
Field Manager at Chicago Races

IF there is the proper desire on the part of the officials who promote and run the National Air Races, the impression can be left with the thousands of non-flying people who view air races that "aviation is an industry for everybody to be in." The material with which to create such an attitude among spectators was available at the Chicago races, yet no use was made of it.

During the races, 470 non-contesting airplanes landed on the field. Add to this number approximately a hundred contesting airplanes and we have 570 airplanes congregated in one place in the short span of a week. This number constitutes more than five per cent of the airplanes flying today; there is no other industry that could collect such a percentage of its total units before as large a crowd as was present at the Chicago air races. Yet we failed to impress this upon the crowd.

The races must attract the public to be financially successful. The aviation industry must impress the public to become financially successful. Next year every airplane owner should be asked to fly to the races, and he should be guaranteed a cordial reception and service for his airplane upon the field.

I. H. SHEARER
Sales Manager, Kendall Refining Company

THOSE who took part in the air derbies showed excellent skill and judgment and made splendid time, but the fact that there were not more than six entries in any one derby leads me to believe that something is wrong and that it should have the serious consideration of the race committee before next year.

I believe that the plan of the committee to have as many derbies as possible from all points of the compass in order to build up interest in all parts of the country is a good one but did not work out as planned. If the derbies were to be run on the same plan as the New York to Los Angeles derby in 1928, that of having all classes start from one point and offering prize money sufficient to warrant the pilots' going to the expense of getting their ships into the proper condition for racing, more interest would be created. In order that the manufacturers might benefit, permission should be granted for ships to enter with a restricted license rather than an A.T.C.

The free-for-all races were very interesting, and no doubt the information obtained as a result will prove very beneficial to the manufacturer.

The method of announcing the winners with their time was a considerable improvement over past years and was greatly appreciated by those in attendance.

A decision should be reached at the earliest possible date regarding location of next year's races and immediately thereafter decision should be made regarding the route of the derby, complete plans made and the information passed along to the pilots several months in advance so that last-minute changes can be eliminated and considerable publicity built up that will be of a favorable nature.

AIR MEETS OF THE FUTURE

By

Alford J. Williams, Jr.

I DO not believe that there will be any more "National Air Races" held in this country. Anything pertaining to the air means "worldwide." Land and water exist on this planet in varying quantities, but the air is the only medium for transportation which spreads over all, and the only medium which can be used for universal traffic. I think our yearly national air demonstrations have achieved such importance and dignity as to warrant a more befitting name, and I suggest "The International Air Pageant."

Cliff Henderson has taught America that his specialty—National Air Races or the International Air Pageant—is a business in itself, that it can be operated as a business and that his organization and plans for such an event are eminently competent to handle the situation. The ramifications of the organization for such an event are multitudinous, though this cannot be appreciated by those who only attend the races on the field. Back of the flying field operations is a tremendous background of a thousand or more people working industriously according to a master plan, and still further behind that background is Henderson. He is undoubtedly one of the budding organization geniuses of the country.

Our air meets in the future must be decidedly international. This year at Chicago, we saw only representative European pilots. I did not have time to arrange for the appearance of really representative, topnotch European aircraft. I only had seventeen days in which to select four European pilots, conclude the semi-diplomatic negotiations, plan for the crating and shipping of their machines and for their personal transportation, visit five European countries, place the whole mission on board the *Leviathan* and start towards America. For next year, we must issue invitations immediately, acquire a place on the aeronautical program of each country, and permit each guest nation to prepare. We must see the best the world has to offer each year and use that as a yardstick for measuring our own aeronautical progress. The sterner the competition, the better aviation will be in the long run. We will thus be able to broaden our perspective and watch a world horizon, forcing us to keep clearly in mind that the development of aircraft design and operation is of extreme international importance and concern.

"Speed" Holman, Thompson Trophy Speed Race winner

U. S. Army Air Corps Photo

"Al" Williams, awarded Barber & Baldwin trophy for the most meritorious flying at the National Air Races in Chicago

The recent air meet gave us an opportunity to review all possible air events and select from the multitude those which are real attractions and conducive to the advance of the industry. I think that in general the derbies ought to be eliminated, with the exception of the free-for-all non-stop and the women's derby. Efficiency contests ought to find a more prominent place on the program. Aerobatics, or demonstrations of airmanship, will always be a great attraction. Thousands of years have passed since the first human became a sailor, yet seamanship is still at a premium. An aerobatic exhibition is simply seamanship of the air and is bound to exert pressure upon the development of air thought.

Speed, and that is what aviation stands for (safety is extremely important, of course, but there is no use cloying a brief message with a dissertation on this recognized item), must be emphasized. Speed has been attained in every other field of transportation at a sacrifice of human life and the people at large must be educated, fortified and prepared to foot a similar bill for aeronautics.

Closed course speed events should predominate the next International Air Pageant. They are most attractive to the public and of extreme importance in our quest for greater performance. Speed—speed—more speed—an age-old demand and necessity which will never be completely satisfied.

Now for something new and constructive—a new series of events which will insure future development. A three-kilometer course (1⅞ miles—the same distance as that required for the world's speed record) electrically timed, governed by the same regulations, should be laid out. The home pylon—i.e., the one erected on the pageant airdrome—can be used as a control tower for the speed course, and at this point could be stationed a chief timer, calculator and all of the necessary officials. The entrants for each closed course event should be compelled to qualify over the time course. This would be an ideal set-up for ascertaining the real high speed of each class. The results of closed course races never tell us the real top performance because they are largely dependent upon piloting skill. However, if we use these two series of events—i.e., the straightaway speed course and the closed course—we will have definite, accurate and valuable checks on top-speed, and piloting skill.

Classifications can be limited as usual by cubic inch displacement of powerplant—275, 350, 450, 650, 800, 1,000 and then the unlimited. We will probably not establish a new world's speed record over such a time course, but at least we may set a new American mark. (The present one was established as far back as 1923 by Al Williams and still stands at 266.6 miles per hour.—Editor.) A chart of results could be prepared, checked year by year and class by class, which would give us a continuous picture of our aeronautical development. (*Continued on page* 160)

A TALE OF TWO CITIES

By Don Rose

IN the moods of honest pessimism which happen sometimes in the best regulated families, the citizen of the big city feels now and then that aviation is still pretty small potatoes in his neighborhood. He must be sometimes aware that the skies above New York and Philadelphia and Chicago and San Francisco are not yet darkened by air traffic, even though the Department of Commerce turns out new totals every year for the encouragement of the air-minded. He is also occasionally disturbed to discover how difficult it is to arouse the metropolitan public to the right sort of enthusiasm for an aeronautical project. And he may go so far as to suppose that the big cities are the backward communities of the country in respect to aviation, while elsewhere the small cities are busting wide open with ambition to be centers of sky traffic.

Such gloomy meditations dragged down my tail assembly lately, as I sat under a Waco wing to watch an American Legion air meet at Philadelphia's municipal airport. It was a nice day for that sort of thing, hotter than the sunny side of Hades and with a blue background to the bright ideas of stunt pilots. The air meet itself was exacty like all air meets since the days of dinosaurs, made up largely of dust, hot dogs, pessimistic pilots, press photographers, wisecracks in the loud speakers, and speculation everywhere as to who won the last race and why. It was said subsequently in the newspapers that there were 30,000 Philadelphians present, in which case there were 20,000 on the inside and the rest leaning on the fence. There were maybe a hundred planes on hand, in various degrees of decrepitude, and more officials than anybody knew what to do with. It was just another air meet.

I sat in the soothing shade under a Waco wing and far from the madding crowd because I had prevailed on Bob Sullivan to make me a member of the contest committee. Bob Sullivan is a gloomy gent who wears black suspenders and is press agent or something for the Ludington line. I had listened long and patiently to the Ludington "line" from its accredited representative, and deserved a red ribbon or something for my pains. So Bob gave me one, not because he had any authority whatever to do so, but because he didn't need it himself, and it took me out on the field where I could talk to Jim Ray and Skipper Lukens and Mrs. Opal Kunz and other prominent but bashful pilots, and enjoy the show as much as could be expected. Policemen went by now and then, wondering why a member of the contest committee had so little to do, but it's no use explaining things to a Philadelphia policeman.

So I sat and wondered at the show, wondering particularly how long it will be before the last OX-5 staggers around a pylon and thunders fearsomely past at ninety-five miles an hour, and wondering some more how a professional parachute jumper can miss a 200-acre field by a mile and a half. Further, I wondered where the people were. For though 30,000 is a good round figure, even after it has been stretched to the utmost limits of a reporter's imagination, it doesn't mean much in a city of more than 2,000,000. Even when each of the spectators had been counted three times, the crowd was not particularly to the credit of Philadelphia as the center of a great metropolitan population and the focus of a considerable section of America's air traffic.

One possible reason for this, of course, is that Philadelphia's official airport was carefully located some six or seven years ago at the other end of nowhere, which was once considered the ideal site for a municipal air terminal. To reach it you take a tired trolley and go across the railroad tracks, past the gas works and the glue factories, through three cemeteries and beyond the sewage disposal plant, and you can make it comfortably in an hour and a quarter from the middle of town. The airport is usually visible in dry weather, and mayors and councilmen are occasionally to be seen there demonstrating their faith in the future of aviation by having their pictures taken for the papers. It called for courage on the part of the Legion to risk a party in such a location, and it demanded further fortitude on the part of the public to attend it as well as it did.

But perhaps it is time to admit that air meets no longer serve—if they ever did—as an index to public interest in aviation. Nor do the casual crowds which gather to watch the air mail come and go, nor the Sunday congregations of sandwich-eaters at roadside flying fields. These are like the gathering of the faithful which once went down to the depot to meet the afternoon train, and nobody ever supposed that the transcontinental railroad was a success because the inhabitants of Muggins Junction stopped work to watch the express go by. Even a steam-shovel can always get a good audience, but if you took up a collection in the crowd which watches it, the proceeds wouldn't buy a pound of steam or a new pair of overalls for the operator.

So my artistic idling at the air meet prepared me to be properly impressed by a more illuminating and inspiring experience. This was my first flight on the Ludington line to Washington and back, starting from the best airport in the East and followed by a personally conducted tour around an air terminal that has gone far ahead in

One of the Stinson trimotors used in the hourly service of New York, Philadelphia and Washington Airways

feeling the public pulse and aiming to satisfy its natural appetites.

The trip began uncommonly well with half an hour's gossip with Miss Amelia Earhart, who is vice president or something of the Ludington line and comes around occasionally to improve the scenery and encourage the customers. We sat a while under the striped awning which shelters the passengers as they walk to the panting planes, and settled everything of importance. Then I stepped unaided into the Stinson trimotor, greatly to the disappointment of the colored porter who would have preferred that I need about a quarter's worth of assistance, and waddled around the field a little and away into the air toward the political storm-center of the nation.

I blush to admit that this was my first flight in a real transport plane. I found it somewhat less exciting than a ride on a moving stairway, but interesting every minute of the way. The route runs over Philadelphia, Chester, Wilmington, Baltimore and all way stations, crosses three considerable rivers and the Chesapeake Bay, and surveys the infinite variety of a big slice of the seaboard states. I found it entertaining to consider with what different eyes the dozen passengers were watching the panorama that passed below. Two business men were alert for every factory lay-out and the crowding of industry to rails and rivers; a gent in uniform might be speculating on what he would do to defend this rich territory from an unwelcome visitor. A newspaper man was obviously spinning a yarn as he rode sky-high above so much good "copy"; a man in a hard-boiled hat got excited at Baltimore and pointed out what his home town was doing to become a great shipping center of the East. Another passenger watched the fields, faded with drought and summer heat, and mourned out loud for the rusty scars of forest fires in the woods of Delaware. And since all these matters were under such expert eyes, I was myself content to note the patterned color of this curious world, ranging from the brilliant gold of fields ripe with sneeze-weed and yellow daisies to the shadowy tints of quiet waters.

Just an hour and a quarter from Philadelphia we slid into Washington Airport, powdered our noses and turned right back in a sister ship. It was now near evening; and whatever bumps and thank-you-marms were in the air on the way down had been reported to the Department of Commerce and removed or disposed of somehow to make everything comfortable for the passengers and make the emergency containers beneath the seats nothing but an idle jest. I have ridden by train, trolley, tram, subway, bus, ship, ferry, horse, mule, automobile and roller skate, but never so smoothly as in this flying limousine in the upper air of a summer evening. It was incredible that we were making two miles a minute, towed by three tough Lycomings over a tangle of highways, a patchwork of human affairs and a hundred miles of hills and valleys, woods and waterways. Some of the passengers thought so well of the arrangements that they went to sleep; two others played rummy all the way home. That's how exciting, thrilling and terrifying it is to travel in a good ship along a good airway.

I know very little about the rest of them except what I read in the papers, but I should suppose that the New York-to-Washington route has more good rubbernecking to the running mile than any other airway in the country. It has also the best business possibilities, so far as they can be reckoned at this stage of the game. It lies within range of nearly a third of the nation's population. It serves three great cities directly and a dozen others by scheduled air connections. It is a natural route for business and tourist traffic. It saves substantial time, in a part of the world where time is money. It is exceptionally well or-

(*Continued on page* 160)

Aerial view of Central Airport, Camden, New Jersey. In the background is Philadelphia, eleven minutes distant

AIR—HOT AND OTHERWISE

A Few Thoughts on the Races
An International Achievement

Frank A. Tichenor

FOR a number of years the interests of my life have concentrated my attention upon aviation, especially aviation in America. In consequence, I have attended most of the aeronautical exhibitions and contests.

The recent air races at Chicago were the greatest in American air history. They delighted me—first, as an enthusiast who for a long time has concentrated energetically upon aeronautics; second, as a business man who long has believed that in aviation lies an immense commercial opportunity; third, as one who realizes that if this nation does not develop the art which it created more highly than others it will suffer, because, vast as may be its peace-time possibilities, its war-time possibilities are so splendid in one aspect that in others they are terrible; and fourth, as a normal human being, full of that curiosity "for to see and to admire" which animated Kipling's soldiermen.

The National Air Races at Chicago in every detail exceeded anything of a similar type ever before known. The name, as I have just used it, was, indeed, a misnomer. The only term which could have covered the event is International Air Pageant (suggested by Al Williams as he sat beside me in the Judges' stand)—and even "pageant" is scarcely big enough to suggest an episode which showed and taught so much.

The event was far more than a spectacle. It was a proof of progress, a competition to induce new effort toward even greater achievement, an educational display calculated to interest minds not previously aware of the importance and possibilities of aviation. This was one of its most useful aspects.

Cliff Henderson has added one more feather to his cap, which because of the number of such symbols, soon will be as picturesque as the war bonnet of a heap big chief of the Arrapahoe.

The wisdom of the Chicago committee in selecting Henderson as director general was proved as fully as Lincoln's choice of U. S. Grant. The really great occasion is fully covered by articles to be found elsewhere in this magazine, but I wish to add a few observations of my own on the subject. The first of these is the conviction that the number of racing days should be cut from ten to five. The second is that the location of the next National Air Races should be decided upon fully two years in advance; such matters cannot be arranged hurriedly if they are to show perfected detail when they finally eventuate. A third is that the handling of these races was so far superior to that of the 1928 and 1929 events that our previous contention of the wisdom of having them handled by a permanent executive group is fully proved. The fact that Henderson and his very able crew have been steadily upon the job has permitted them to become expert. Every potential cause of irritation upon such occasions, as indicated by experience at previous shows, had been rendered impossible by preventive medicine before the actual show began. Henderson and such aides as he selects, should be created into a permanent Contest Committee to establish, maintain and work from headquarters at whatever point may be selected as the next exhibition center for this great nation's display of aeronautical progress,

We hope that the Powers That Be at Washington will continue Army, Navy and Marine Corps participation in the National Air Races. The spectacularly splendid flying done by members of these services at the Chicago races never has been equalled in this or any other country of the world. Its presentation to the direct observation of the great spectator crowds and to the indirect knowledge of the nation through capably observant and appreciative representatives of the nation's newspapers was excellent. Compliments were plentifully paid to these astonishingly expert, daring and mentally developed young human units in our aeronautical organization for defense, by observers who had come from foreign lands to watch American fighters in the air. The Europeans gazed with an appreciation which was really based on competent knowledge and the praise they voiced was sincere and earnest—at once wonderful and wondering. Army formation flying received the greatest applause. Professionals were delightedly impressed and civilian amateurs were thrilled and even awed. It surely was the best flying of a week full of astonishing performances. The Navy and the Marines were skilful, disciplined, nervy and competent and did themselves and their country credit, but the Army Air Corps certainly deserved the special commendation which the public beyond question gave it.

THE merger which binds under one management as one entity in the investment market the New York, Rio and Buenos Aires Line and Pan American Airways long ago was foretold in these columns. It is the greatest organization achievement in the history of human transportation by any medium—land, water or air.

Technically the transaction was the purchase by Pan American Airways of the New York, Rio and Buenos Aires Lines. September 15 this became the world's greatest, and such it seems likely to remain.

Here is a truly splendid enterprise emanating from and owned by brains and capital indigenous to and functioning from the United States, though touching United States territory only at its termini—Miami and Brownsville, Texas, and at its airports of call in Porto Rico and the Canal Zone. Working thus from and to Florida and Texas, the planes of this gigantic service carry passengers or mail, or both, over established air routes extending 20,000 miles (almost seven times the distance between New York and San Francisco, circling the vast South American Continent, and flying a total of 100,000 miles a week.

This splendid organized utility is worthy of the United States. The British Empire's greatest comparable aerial transport system is the Imperial Airways route from London to Karachi, covering 5,000 miles. The French have nothing which is really comparable. Their line through Dakar, in West Africa, which connects by steamer with the French aerial line, from Pernambuco to Buenos Aires, is interrupted and lessened in possible effectiveness by the sea voyage, which not even the daring aviators, able builders and progressive capitalists of France have found as yet a way of replacing by air transport.

That our Federal Government should have encouraged this American consolidation was natural, for it put a vital enterprise upon an impressively firm financial basis, which

(*Continued on page* 142)

THE FIRST NON-STOP FLIGHT FROM PARIS TO NEW YORK

Coste's Own Thoughts and Impressions on Flying Across the Atlantic from France to the United States

By Major Dieudonné Coste

WHEN we took off from Paris we knew it was the greatest moment in our lives. It was the culmination of three years of hard effort, not unmixed with many heartbreaking disappointments. If we had not left at that particular minute we might well have faced three more years of delay before accomplishing the first flight from a city of the Old World to the greatest city in the New World.

There were many exciting moments during our trip, and at times I could not be sure from one minute to the next —now that it is all over —which was the greatest thrill. I think, however, that that came after we first sighted the coast of North America. As you know, the coast of Nova Scotia is full of bends and turns, fills and rivers, promontories and little gulfs.

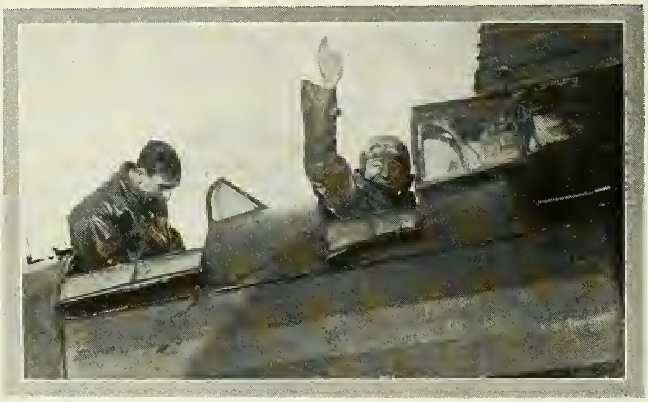
When we reached the coast we were determined not to lose sight of it again. In order to keep it in view we had to follow all these devious turns and that was a job. At the same time we had another problem. The sky was overcast, it was raining, and we had to fly below those rain clouds. Sometimes they were extremely low, which made it necessary for us to fly as close to the water as ten meters.

We came to one bend and turned it; we flew on, skirting a precipice. Suddenly there loomed up out of the mist another precipice on our port side. We were caught between the steep banks of a river—what river, I do not know. It was a tight place.

Bellonte was at the controls at that time and he had to think fast. Fortunately, having flown thousands of miles, the ship was light. Bellonte gave her the gas and shot upward.

It is not pleasant to think how close we came to those cruel, jagged rocks. We went up fairly high and began to fly steadily by instrument. Some time passed before the clouds and the rain cleared somewhat, and then we were over what I believe was the Atlantic off the coast of Maine. We came down a little later through a new bank of fog and headed down the coast until we were over a large city.

We were so interested in trying to determine what city it was that it never occurred to us that this was the first great city we had passed since leaving Paris. Only a few minutes later we passed another city, and now there was no doubt. We identified it as Boston. We continued the flight without further incident before landing at Valley Stream.



P. & A. Photo

Major Coste (waving to the crowd) and Maurice Bellonte upon their arrival at Valley Stream in New York, from Paris

The tremendous load of fuel required for this flight, in which we expected to buck prevailing unfavorable winds, gave us the first real thrill of the voyage. Would the ship lift off the ground? That was our great concern. We had 5,200 litres of gasoline on board.

But this great fear passed in a few moments and we found new cause for concern with each passing moment. There were storms ahead. We would have to push our over-weighted ship through them. We ran into the first of these disturbances off the Irish coast. The second gave us some trying moments, not long afterward, over the ocean, but fortunately we were able to escape the worst of it. The third—and probably the worst of all—was the storm we encountered over Nova Scotia.

We had to find the best route to Nova Scotia, and that in short order, if we were to avoid the hazards that faced the *Bremen* when it ran into fog and storm of a similar nature and was forced down hundreds of miles from its goal.

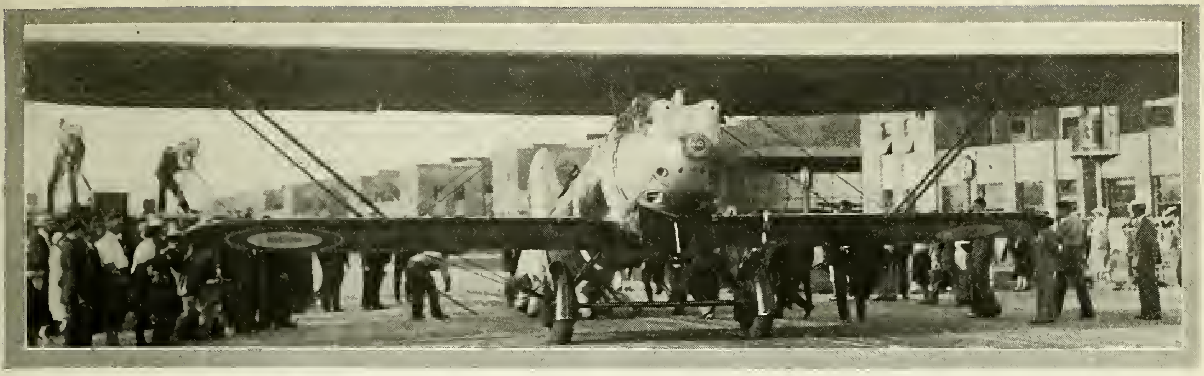
In seeking to avoid this storm we were obliged to fly 100 miles out of our way to the south. We did not find land, as we had expected, so we turned northward again, flying another 100 miles. Time was swiftly passing. Each minute meant the loss of more of our precious fuel. Again we turned.

It occurred to us that three is a lucky number. We had faced three storms—were we now to be defeated? We were sure that we would not be.

After three hours of searching we computed that we must be very near the coast of Nova Scotia. At 3:00 a.m. (French time)—for we had not changed our clock—we sighted land. At the same moment it became obvious that the winds were abating. Naturally we were very happy—very happy. The only thing that could stop us now, we thought, would be failure of our motor.

It had carried us already from France to North America and we knew that it would not fail us now. We had perfect confidence in its staunch heart, and that confidence was justified. The motor was wonderful. It did all that we had hoped it would.

Weather conditions, on the whole, were very favorable—at least the winds were on our side. On the other hand, almost the entire route was clouded over, and we went hour after hour over that watery waste through a thick white mist. We could not see what lay ahead, below, or above. It



P. & A. Photo

The "Question Mark" taxying along the hangar apron at Curtiss Field, Valley Stream, L. I., after arriving from France

was like floating in a dream. There was something unreal about it—unreal and awesome. We were two, but we seemed so all alone.

Most of the time I was at the controls, and there was plenty to keep my mind busy. There was no time for dreaming. Constantly I had to shift my course to find a way out of the haze. Sometimes we dropped the plane down to less than 300 feet from the waves. At other times we were up to 2,500 feet. We seldom went above that mark, and never very much above it.

But we had our reward. Although my mind was taken up with the details of navigation and the business of control, with my eyes constantly on the instrument panel, I could not help but feel some satisfaction as we passed over the first signs of human habitation. It was a great relief after riding the mists.

Later, as we came down your coast and saw below us great centers of population—widespread blocks of homes—some of the thrill was gone. Of course it was a great satisfaction, but after all, the battle had been the flight across the sea, the war with the elements over the ocean. We had arrived in America, and now our only thoughts were for Curtiss Field, our final objective.

When at last we arrived over Long Island we were tremendously happy. Of course, when we left we had gone with the greatest confidence that we would make it. And when we did we were greatly moved, not only by accomplishing the flight, but even more so by the great reception which was given me the evening of our landing.

After all, it was not the flight itself as much as the preparations that counted. Any one can get in a plane and attempt to fly across the Atlantic, but it is the preparation which determines success or failure. We did not hesitate to make our decision to try to leave not later than September 1st because we knew that we had done all that any one could do for the trip. We had overlooked nothing.

Meteorological conditions were not as perfect for the flight as we had been led to expect. There were extensive areas of low pressure carrying favorable winds, but not along the entire route. The conditions in France were far from good. There was considerable fog in the northern part of my country, and we ran into dense banks of it again in the south of England. However, we had made up our minds to leave on September 5, come what might. We reached this decision on Sunday.

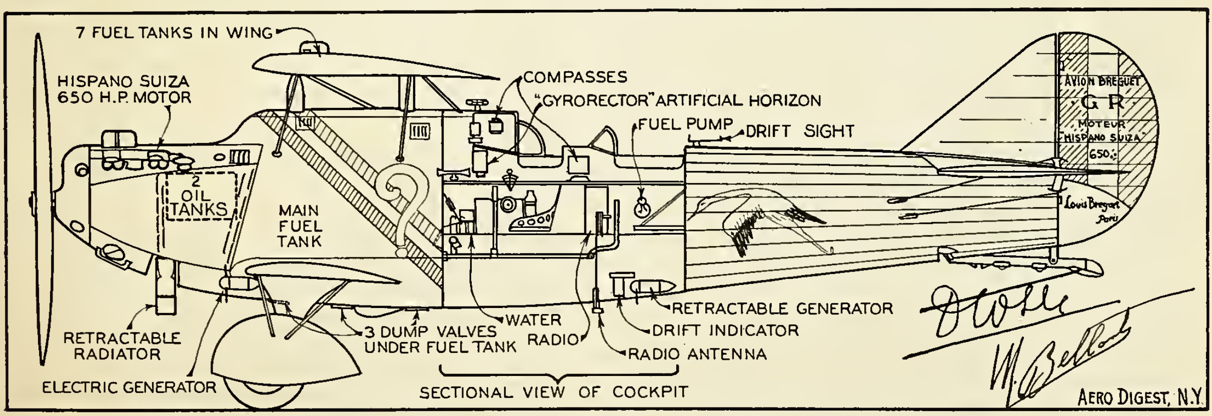
We met some trouble getting ready for the flight because there was the Sunday holiday and not many men were available.

Finally, we did the best we could with an emergency crew, hastily mobilized, and on Sunday night the plane was taken from the airdrome of Villacoublay to the airdrome at Le Bourget, where it was put in the care of expert mechanics.

The food we were to carry was contained in two small aluminum boxes.

We waited for the dawn with great impatience. The fog at that time was so thick that we could not see farther than two kilometers. The landscape was a gray blur, and the air was wet with the mists. That made us restless. We could not leave and the hours began to drag. We simply had to wait for that fog to lift.

With the aid of our friend Viau, the meteorologist, we made a weather map, based on telephone reports from every point on the English Channel, to learn if there was some little loophole in that blanket of fog through which we might steal our way. From American sources, as well



Sectional drawing of the Breguet "Question Mark," showing the arrangement of instrum ents and equipment

as from the French weather bureaus, we knew that except for the fog near us conditions were uniquely in favor of a westward flight.

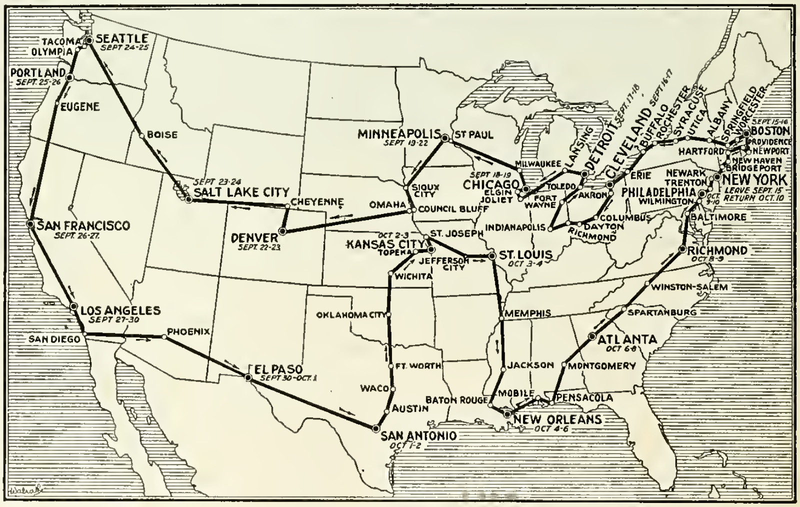
We had to find that loophole if we were to get the advantage of those conditions. We telephoned to Nantes, to Brest, to Cherbourg, to Havre, to Dieppe, and even to Calais, but all the doors were closed and we had to wait. About 10:30, however, there was a slight improvement. Twenty-four minutes later we took the chance. We took off in the face of the mists.

Our struggle with the elements had begun. We felt certain that if we could get out of France we would reach New York before the following night. Sixty square meters of cloth fabric had to lift 6,300 kilos, our total weight, and had to carry that tremendous load through valleys, over hills, past all kinds of projections and towering heights.

But we forged ahead, most carefully. Our weight was too great to ascend to a really safe altitude. Finally, we reached the English Channel, just north of Rouen. At the same time that we left the dangerous stretch of territory behind and got out of the fog. Over the water, the air began to clear. Now we could fly above the clouds.

We went up to 700 meters, then to 800 meters, but this did not last for long. We encountered a threatening storm area, black and menacing, that barred our way and we were forced to drop again. It was a game of hide and seek—the storms reached for us and we dodged out of their way—until we reached the coast of Ireland.

Here the sky was a bit clearer, and to the north of us, beyond Cape Valencia, our speed, in spite of temporary adverse winds, was more than 200 kilometers an hour. We then saw the Atlantic rolling under us. We were leaving the Old World behind. We went on, hour after hour.



Courtesy of N. Y. Times

Map of the itinerary of the Coste and Bellonte good-will tour of the United States

A few hundred miles west of the Irish Coast we ran into a bank of cirrus clouds, indicative of more storms to come. We were ready for a fight with ocean winds. The visibility lowered, and we had to swing farther northward than we had planned. For a time it seemed as though we might have to go to Iceland and go inland there. That was not a pleasant prospect.

Again we started playing hide-and-seek. I shifted our course to the north, then I shifted it southward. Everywhere the clouds marshalled their forces to block our way. Finally, after innumerable change of direction, we found a clear path. Not only did we escape the storms for a while, but found favorable winds, too, to carry us beyond. This good fortune lasted most of that day and into the night.

Of the night there is little to be said. The fog blanketed the ocean with startling swiftness. We could not see the water beneath, nor the stars above. Never have I known darkness so complete. It became monotonous. Only the song of the motor and the tedious watch of the instruments. We yearned for daylight, and relief came to us when we saw it.

We computed our position as thirty-five degrees north, forty-six degrees west, at the coming of the dawn. This indicated to us how capricious the weather had caused us to make our path. Our next objective was Nova Scotia.

And again we had to search for a clear path around new storms. We dodged through areas of cloud, seeking out favorable winds. We did not know whether the last of the journey would be smooth. We knew that we must find the best route to Nova Scotia. That was one of the danger points.

It was then that we began the long dodge of 100 miles to get into clear weather, and when at last we had found it the merry motor seemed to rejoice. We tore along the coast at top speed, certain then that we had conquered the Atlantic.

THE thing that impresses me most as I look back upon those hazardous hours is the radio. I followed very closely the comment of Major Kingsford-Smith, a great aviator, upon his successfully negotiating the westward passage of the Atlantic. He laid particular stress upon the radio. I do the same. I should say that the radio is just as indispensable as the motor itself.

I say this in spite of the fact that the radio failed us at the latter end of the voyage. Our radio, of 100 watts input, was capable of establishing communication over distances up to 1,000 kilometers on the 600-meter wavelength. That is the wave used by ships and all trans-Atlantic liners.

Throughout the long hours after we passed over the French coast line north of Rouen until we had made a landfall on the Western Hemisphere, we were in constant touch with ships and at times with French and then American coastal stations. If one can picture the sensation of being seated in an open cockpit, hour after hour—age after age it seemed to us—with nothing about one but rain and mist, one may obtain a hazy picture of what those little vacuum tubes, coils and plates meant to us.

On the whole, all instruments worked splendidly, including the radio.

All this should point to the fact that the success of our flight was not dependent upon courage, heroism or anything of the kind. If others who have attempted to fly from Europe to New York have failed, the chances are that it was because of lack of adequate preparation. I cannot stress this too much. Others have taken off with an excess of courage and a lack of reflection.

I admire them all. They have, of course, my highest regard, for, despite failure, all of them have contributed something to the coming era of trans-Atlantic aviation.

EDITORIALS

SOUND BUSINESS BASIS AT HAND

B. C. FORBES, who is as shrewd a financial observer as the nation possesses, has studied the aircraft industry with care and says: "The coming year should see surviving companies on a sound basis . . . . Aviation has duplicated the performance of almost all new industries."

It has had its troubles, he admits—troubles of haste and over-enthusiasm, of unscrupulous promoters and money raised on rosy promises, accompanied by overproduction, and disappearing founders of unjustified enterprises, while legitimate enterprises have suffered. But then:

"Consolidation. Big companies become bigger. Stronger ones increase their grip upon the industry. Winnowing of wheat from chaff proceeds. The industry, having reached bedrock, starts to climb healthily. Aviation has almost completed this customary course. A new and better era is about to dawn."

B. C. Forbes has watched many industrial trends. He has studied aviation carefully. He is a definite conservative. When Forbes sees the "better era" coming, it is surely on its way.

NO OKLAHOMA TAX

AN ADMIRABLE fight to beat an effort at placing an improper burden of taxation upon aviation in Oklahoma has been waged and won. Many have been engaged in this endeavor to prevent the short-sighted state authorities from levying an inexcusable tax on airplane fuel. Relief for the air transport companies is assured by the permanent injunction which has been secured, and for this relief much credit is due to Bill Skelly of the Skelly Oil Company. Thanks to him and his energetic and far-sighted associates, a construction will be given to the statute which will save it from constitutional infirmity, if possible, by making it inapplicable to gasoline bought and consumed as fuel to propel airplanes engaged in interstate commerce.

American aviation owes a debt to the Oklahoma State Chamber of Commerce and its efficient staff and committee, to the Hon. J. Berry King, attorney general; Hon. F. M. Dudley, assistant attorney general; Hon. A. S. J. Shaw, state auditor; and Hon. H. V. Bird, gasoline tax auditor. But especially it owes a debt to Skelly. Skelly is a name which suggests competence and good judgment.

TRANS-OCEAN DIRIGIBLES

BEFORE us as we write are two articles, one from the New York *Times*, by Captain Wolfgang Von Gronau, and one from the New York *American*, by Admiral W. A. Moffett. They deal with trans-ocean air passenger transport and come to the same general conclusion, which is that this will be accomplished, at least in a practical manner, by the use of dirigibles.

Von Gronau believes that planes will carry mail and freight, but that airships, because of their comparative safety and their commodious accommodations, will carry passengers. In expressing the hope that nothing may be permitted to interfere with the construction of the Navy's ZRS-5, Moffett directs attention to the fact that in the future the lighter-than-air ship will confine its activities principally to commerce while its use in war-time will be more auxiliary than that of the automobile.

Thus, obviously, he regards the dirigible principally as a vehicle of peace and inasmuch as this would add to the willingness of nations to see other nations establish ocean traversing dirigible passenger lines, the fact may be a noteworthy encouragement of progress. He definitely predicts leviathans of the air, of 10,000,000-cubic-foot capacity. capable of circling the earth in ten days or less, with the New York to London trip occupying not more than a day and a half, and the return seventy-two hours. He urges the United States to be the world's leader in this field and thereby voices his conviction of a great necessity.

In America's natural monopoly of helium gas he finds an added argument for Yankee leadership in this development. Herr Eckener made it very clear that Germany and all the rest of Europe envy us this wonderful possession.

Von Gronau's prediction of trans-ocean dirigible passenger transport came soon after his arrival in America by his fine flight overseas. He expects trans-ocean passenger service though he is unwilling to predict when it may be established. He believes, however, that the more advantageous flying weather of the South Atlantic will make that the first field of operations. Such an opinion is natural to a native of a land intensely anxious to secure for itself (which would mean sequestering from the United States) the immense potential South American trade which inevitably will flow to that country first furnishing quick trans-ocean transport.

Von Gronau says real trans-ocean flight will necessitate new engines and new fuels. AERO DIGEST knows that we shall have them both. And if Germany with her dirigibles is first to start the regular line and thus capture the cream of the business, it will be far less to the credit of the Germans than to the shame of the Americans.

HERBERT HOOVER, JUNIOR

BECAUSE of Mr. Herbert Hoover, Jr.'s, illness, there must unfortunately be an interruption of his radio articles which have been appearing monthly in AERO DIGEST. Upon his physician's advice he is foregoing all business activities for a time; he has obtained a leave of absence from his duties as Chief Engineer of Western Air Express and is at present recuperating at his father's camp at Rapidan, Virginia.

Mr. Hoover prepared his articles only a week or so in advance of publication so that they might present the most recent data on his subject. Consequently it is impossible to publish at this time the second portion of his article entitled "Radio on the World's Airlines" which appeared last month and which was to have been followed by an article describing the radio systems of several American transport companies. A brief outline of the events leading up to the formation of Aeronautical Radio, Inc.—a cooperative non-profit organization set up by the major airlines of the United States—was also to have been given.

We know our readers join us in regretting Mr. Hoover's illness and earnestly hope he will soon be well and able to resume the articles which have won him many admirers in the fields of radio and aeronautics.

DEVELOPMENT of the AUTOGIRO

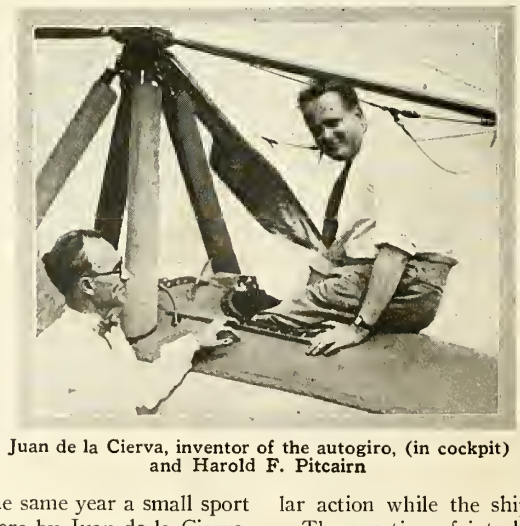
Agnew E. Larsen
Chief Engineer,
Pitcairn-Cierva Autogiro Company of America

AUTOGIRO development, carried on quietly but effectively during nearly a year in which aeronautical progress had been a daily topic of the press, was presented at the Chicago National Air Races in a fashion which again brought to the fore the seriousness with which any calculations of the future of aviation must take account of the windmill craft.

Agnew E. Larsen

Three machines flew daily during the races, excepting on the last Sunday and Monday, when the autogiro was demonstrated at the Gordon Bennett Balloon Races in Cleveland. Two of these machines, built in this country for the Pitcairn-Cierva Autogiro Company of America, flew from Philadelphia to Chicago in six hours and fifty minutes. This performance eliminated any remaining doubt as to their capacity for suitable speed in cross-country work, for over this route they flew an average of better than a hundred miles an hour. The third machine, a small English model, was shipped directly to Chicago. During the stay at Chicago, the autogiros were quartered at the Cicero Municipal Airport, twenty-five miles from the Glenview airport, flying over every day for their event.

The most recent machines, both those constructed here and those built to the order of the Cierva Autogiro Company, Ltd., in England, may be considered in every way as practical workaday aircraft. Test pilots have repeatedly stated that they have the maneuverability, smoothness of control and touch that experienced men have come to look for in all well-engineered aircraft. This in addition to the qualities of vertical landing, quick and safe take-offs, which are the special province of the rotating-wing machines. Concurrently with the betterments in convenience and ease of handling have come substantial improvements in performance over the relatively crude experimental autogiros which have been flying since 1923.



Juan de la Cierva, inventor of the autogiro, (in cockpit) and Harold F. Pitcairn

During the past six months work has progressed toward rendering the machines entirely practical for everyday use under all conditions. The principle by which they fly, so we felt, had been proved long ago, and within the past year had been developed to a high enough degree. It remained necessary only to eliminate minor bugs and smooth out rough spots which are a part of all experimental aircraft.

The first American machines were completed in early October of last year. During August of the same year a small sport machine had been brought over here by Juan de la Cierva, the inventor, and demonstrated at the Cleveland National Air Races. It aroused considerable comment. The performance of the machine at the races was rather disappointing, however, because it had not previously been flight tested and a suitable propeller for its high speed engine was not available in this country. Nevertheless, there had been incorporated in its design a new type of rotor blade, of narrow chord and relatively great length, which soon showed its adaptability to further development.

Longer blades of the same type, intended for use on the American machines, were built in England and sent over here. Under changing climatic conditions, the plywood covering could not be kept true, and it became apparent that some other form of blade construction, retaining the advantages of the long narrow form, would be necessary.

Experimentation toward this end occupied several months, both here and in England, though the American and English engineers were working along different lines. Early this year the first set of American blades was completed and, a little later, the New English blades came through. The American blades were constructed on tubular steel spars which had been reinforced against flexibility in the plane of rotation by shrinking elliptical steel tubing over them for about sixty per cent of the distance out from the blade root. Ribs formed of wood pressed between thin layers of dural were riveted on collars about every six inches. Doped, laminated fabric was the outer covering. The blades turned out slightly heavy but in every other way satisfactory.

The English blades were made without the reinforcing elliptical spar, had about twice as many ribs, were covered in the same manner, and were considerably lighter. The tips were formed by pressed dural cans, whereas on the American blades the rib-and-fabric structure was continued out to the end.

The blades used on the present American ships represent a composite design of both types. Spars of the reinforced type developed here are used. The English plan of numerous ribs—approximately eighty ribs on a blade of twenty-four-feet length, is used. Our own detail development of ribs mounted by hollow aluminum rivets to soldered collars is retained. Since nearly ninety per cent of the ribs are formed of two standard sizes, this type of blade represents fairly good possibilities from the production standpoint.

Practically absolute accuracy of airfoil section and incidence can be maintained throughout manufacture in these blades without undue trouble. This, with a minor rearrangement of the hub, has eliminated any slight tendencies toward irregular action while the ship is in flight.

The question of interbracing was satisfactorily solved by substituting a simple friction damper for the old shock cord sections. This is an arrangement of clamped fiber discs, resembling outwardly and in principle a small automobile shock absorber. It is mounted inside the blade, and to its arm the cables between the blades are carried directly. By

Four autogiro models lined up at Pitcairn Field, Willow Grove, Pa.: Left to right, recent English type with double tail surfaces; older Wright-powered American machine; recent Wright-powered American model; new Warner-powered American sport job

this means any rough action while accelerating on the ground is easily damped out.

In the past, the greatest objection to the autogiro as an everyday machine had been the necessity for ground taxying to get the rotor turning to its required speed before take-off. We are fully satisfied with mechanical self-starters to eliminate this difficulty, and the English company has developed a method of starting the rotor by means of a biplane tail surface which on the ground forms a scoop to divert the slipstream upward into the rotor blades.

The self-starter used on the large green American machine at Chicago weighs about sixty-five pounds, which figure has already shown itself capable of reduction. The starter on a smaller American machine recently built weighs but thirty-five pounds.

Drive is taken from the rear of the engine crankshaft, the driveshaft being faired in with the rotor pylon structure. At the head the starter mechanism resembles an automobile pinion and ring gear. Immediately below this final gear is an over-running clutch which permits the rotor to accelerate beyond the speed it is driven by the engine. This makes declutching of the mechanism unnecessary, although as a matter of safety the main clutch is never engaged except for the start.

Approximately ten horsepower is required by the starter, but this is ample to bring the rotor to adequate speed in about thirty seconds. The problems of torque have not influenced the structure of the rotor supporting structure at all, because so little power is required. The engine scarcely shows that it is under load when the starter is connected.

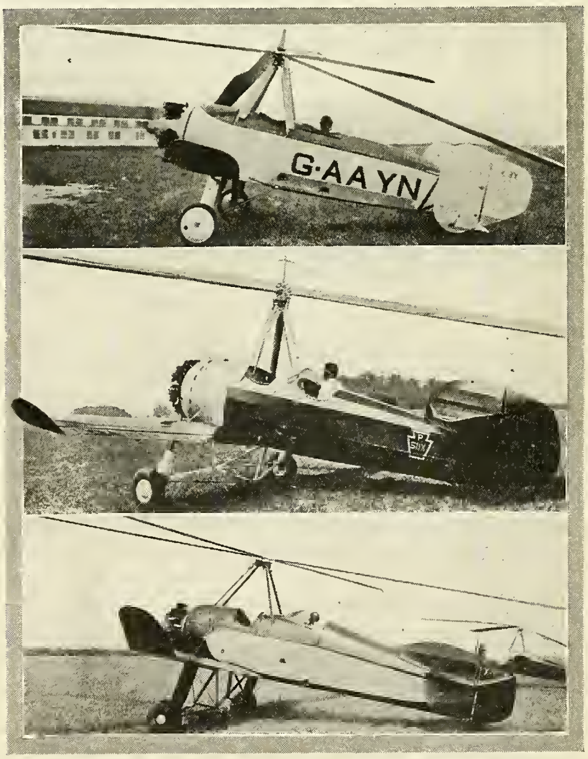
During the time when the self-starter was being developed, a simple braking arrangement for the rotor was incorporated. This is the familiar Bendix brake, of a size comparable to that used on the wheels of the average ship. In use, it stops the rotor before the machine can taxi to the line after coming to a stop on the ground.

Wind tunnel and flight research have demonstrated that the rotor of a properly designed autogiro will not diminish its rotational speed as a result of greater forward speed. If a properly designed autogiro is dived beyond twenty per cent of its maximum top speed in level flight, the upward and downward travel of each blade will increase, until the blades will begin to tug on the cables which support them when the rotor is at rest and centrifugal force is absent. This tugging will occur some time before any possible trouble can develop.

Although almost unlimited stress can be placed on an ordinary set of wings by sharply pulling out of a prolonged dive, the blades of the autogiro are free to yield against the restraint of centrifugal force, which prevents the stress from increasing to more than four gravities. The pilot cannot inadvertently dive to the point of danger in an autogiro.

One of the greatest dangers of the stall in an airplane is its lack of warning until too late to make use of corrective control. There are also times when the pilot cannot avoid the stall even if he recognizes it. When caught blind, the pilot of a conventional airplane sometimes unknowingly dives at great speeds because he is afraid of stalling and consequently avoids flying too slowly. On the other hand, the pilot flying an autogiro immediately slows down if caught blind. In fast flight the autogiro is as stable as an airplane, and if the stick is pulled right back for vertical descent the stability becomes greater. In vertical descent the fuselage is hanging on the rotor like a pendulum. It is, however, a pendulum free from all oscillations, since the articulations connecting the blades to the rotor hub eliminate such tendencies. From the point of view of comfort, the severity of air bumps is greatly diminished because of the freedom of the blades to yield upward.

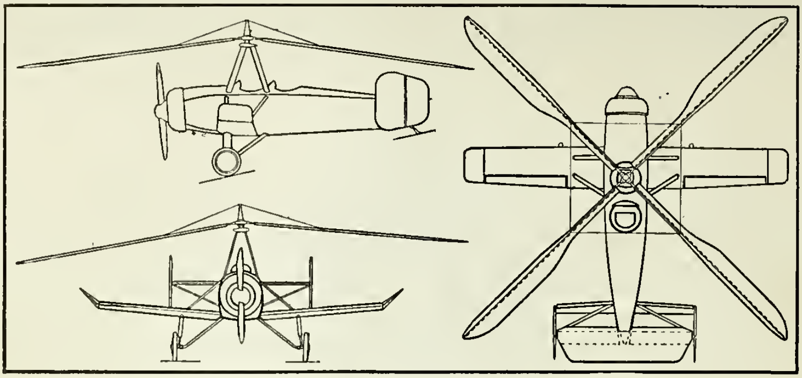
It is not possible to bring the angle of attack of individual rotor blades near the angle of maximum lift; consequently, they cannot stall. The high rotational speed of the tips will always present the outer portion of the blades at small angles of attack, even when the rotor as a whole is brought into an attitude of high attack angles, as in vertical descent.



Upper, English autogiro with Genet Major engine; center, two-place experimental machine built by Pitcairn; lower, recent three-place American job with mechanical rotor starter

Therefore, whereas excessive loss of speed will cause an airplane to fall out of control and spin, the autogiro merely settles slowly. On recent models the rate of descent has been ascertained to be around thirteen to fourteen feet per second, which is slower than a parachute. Even in this condition, the machine is under control. It is obvious, therefore, that the machine can get into any space large enough for the rotor blades to rotate.

Although the rate of climb of the autogiro is no better than that of the conventional airplane, its angle of climb is very much better because it climbs at a slower forward speed. So far as taking off in safety is concerned, if the engine cuts while the autogiro is climbing steeply, the machine immediately starts settling vertically, or, at the will of the pilot, enters a glide. Thus, because of the low forward speed, the pilot has much more time to use his judgment as to whether or not he can clear any obstacles. In fact, he can wait until he approaches an obstacle closely, then sit down directly in front of it and taxi off for a fresh start. He has the further choice of turning, because the slow forward speed enables him to turn in a startingly short radius.



Outlines of the British Autogiro with double tail surfaces

An encouraging factor in autogiro development is the machine's responsiveness to improvement. Betterment in one phase of its performance is reflected in every other phase. There is far less compromise necessary between high speed and landing speed or high speed and climb. Improving the efficiency of the rotor for forward flight can better its efficiency during vertical descent.

Although the engineering which enters into the design of autogiros is highly complicated, it is now on an entirely definite, predictable basis. The factors of autogiro design are all based on the carefully correlated findings of modern aerodynamics, although they are applied in a new way. We can now predict closely the actual performance of a given machine.

This was exemplified in the case of the most recent American machine, the green PCA-2, which had been assembled only a short time before it was flown to the Chicago races. This machine fully justified all performance predictions.

Of the machines at Chicago, the two larger autogiros were of distinctly American design; the smaller was the standard English model termed C.19 Mark III. The American machines were both powered with standard seven-cylinder J-6 Wrights, and the little English machine was fitted with an Armstrong-Siddeley Genet Major of 110 horsepower.

It may be interesting to note that the older American machine, which had previously had hundreds of hours of flying, flew every day during the period August 20-September 8, and covered more than 2,500 miles of flying. Included in this was a great deal of strenuous cross-country work at high speed. At no time was any trouble experienced.

The staff of test pilots includes Harold F. Pitcairn, head of the Pitcairn aeronautical interests; James G. Ray, vice president of Pitcairn Aircraft, Inc.; C. J. Faulkner, and J. Paul Lukens.

Upon the return to Philadelphia at the close of the Cleveland events, the older American machine was demonstrated at the American Legion Air Meet held at the Philadelphia Airport, September 6 and 7. The following day it was flown to Newark Airport to participate in the celebration marking the appointment of Newark Airport as the Eastern terminus of the transcontinental air mail. The machine was put through a series of maneuvers by James G. Ray. These included a number of vertical landings, in which the only necessary use of the controls is to pull back sharply on the stick.

As the climax of the celebration a parade of air mail, express, National Guard and transport ships of various types was flown over Newark and New York City. The autogiro headed the procession.

Although no definite date as to the start of commercial production can be given, we believe that a limited production schedule will be entered by Pitcairn Aircraft, Inc., within the next few months.

Weights and high speed of the three machines flown at Chicago are as follows: Newer three-place American machine—weight loaded, 2,800 pounds; payload, 600 pounds; high speed, 125 miles per hour. Older three-place American machine—weight loaded, 2,650 pounds; payload, 500 pounds; high speed, 115 miles per hour. English machine—weight loaded, 1,450 pounds(with pilot, one passenger and baggage) ; high speed, 95 miles per hour.

U. S. Army Air Corps Photo

The new three-place American-built autogiro making a demonstration flight at the Chicago air races

The PRINCIPLES of AERODYNAMICS

ARTICLE 4. THE SQUARE LAW

Dr. Max M. Munk

THE square law recommends itself by its very name. It is reassuring to us that, in a world that is so full of crooked things, the principal relation in aerodynamics is called square by universal consent.

The phrase "square law of aerodynamics" is used in the limited and original sense derived from geometry. The area of a square is computed by multiplying any one side by any other side. For this reason, the product of any number multiplied by itself is called its square. The square law of aerodynamics denotes the multiplication of quantities by themselves.

This law deals with the comparison of corresponding air forces of two airplanes or of a full-sized airplane and its reproduction at a smaller scale, or with the comparison of the corresponding air forces of one and the same airplane at different velocities. In any case, it deals with the comparison of air forces under geometrically similar conditions. The two airplanes must be similar—either equal, or reduced or enlarged to scale. The inclination of the airplanes relative to the direction of their motion must also be the same. The similarity must include shape and motion. In fact, every detail and every condition—except scale and velocity—must be the same for the two airplanes.

The square law states that the air forces are then proportional to the square of the scale (or of any linear dimension) and to the square of the velocity. The pressures at equivalent points are proportional to the square of the velocity, but independent of the scale.

This law constitutes the fundamental relation for all aerodynamic computations. It is extensively and continually employed by the aerodynamic engineer, so often that its application has become a habit, which is performed perfunctorily, like walking, and not by reasoning. It is difficult to see how our usual aerodynamic computations could be made without such law. At twice the speed we have four times the air forces. This simple rule has become indispensable, and all aircraft design is based on it. It should be thoroughly understood by every aircraft designer and by all future aircraft designers.

The limitations of the square law should also be thoroughly understood. In most practical cases the square law is fairly correct; sometimes it is surprisingly correct. Yet it is not exactly true nor particularly well founded. It is merely a close approximation to the fact, excellently fitted for the needs of the drafting room. It is an engineering law—not a physical law. It is an approximation often true but more often *almost* true. Closer to the fact in many cases than experimental evidence, but still a relation that needs constant checking by experiment, it must be used with caution in novel and unusual cases.

The square law is absolutely correct for potential flow, that motion of the air under ideal conditions. Bernoulli's law states that the pressure is then proportional to the square of the velocity. Since the air forces are made up of sums of products of pressures and areas, and since the areas are proportional to the square of the length, the square law is thereby established for potential flow.

By no means, however, is the square law limited to potential flow. The conditions for the exact validity of the square law are much wider. A circular disc, moving face ahead, has a large drag, which fact indicates that the flow created by the circular disc is not potential flow; for potential flow has no drag. Experience shows that the drag of the circular disc follows the square law remarkably close, furnishing an example of non-potential flow with an air force governed by the square law.

A law as simple as the square law must have a foundation equally simple. The condition for the validity of the square law is indeed so broad and direct, so obvious, that it is often mistaken for a fact, and wrongly implied as a matter of course without sufficient justification. Many people think that if two exactly similar airplanes move in a similar way, the air also moves similarly. They think that all corresponding streamlines of the two flows created are then geometrically similar, and the ratios of all corresponding velocities are alike.

If that were true, if the entire motion and not merely the airplanes giving rise to it were similar, a very simple law would prevail, and this law would be the square law. All forces, as well as resultant forces, would then follow simple algebraic relations. The aerodynamic air forces are practically mass forces, and their relations are governed by the relations of mass forces.

Mass forces are proportional to the square of the velocity, for the changes of the motion are proportional to the velocity itself; and the time available for such change is inverse to the velocity, because the air particles travel so much faster between corresponding points. The ratio of the velocity change to the time for such change is therefore proportional to the square of the velocity. Mass forces are further proportional to the square of the length, or to the area. The masses are proportional to the volumes or cubes of the length, and the time for corresponding changes of motion is inverse to the length, because it takes so much longer for a particle to travel between two corresponding points. Hence the product of mass times rate of change of velocity is proportional to the square of the length. With similar motions, the mass forces follow the square law exactly, and this is the foundation of the square law of aerodynamics.

For the same reason, the square law holds also for similar motions of solids. Centrifugal force, for instance, is proportional to the square of tangential velocity. For equal masses, it is inverse to the distance from the axis, but for corresponding masses, it is proportional to the square of this radius. Similarity again creates the square relation.

The square law of aerodynamics is therefore seen to be linked with the geometry of the flow pattern. The flows are not always necessarily exactly similar, even if the airplanes are. They may differ slightly, in which case the square law is only approximately complied with; or the flows may be of an entirely different pattern, in which case the square law is entirely wrong and leads to results not in keeping with fact.

The latter case is seldom met in conventional design, and the square law is generally accepted with confidence. It must then be correctly applied, and the proportionality with the square of corresponding velocities carefully observed—not with the square of the angular velocity. Two similar propellers work under similar conditions if the ratio of the forward speed to the tip speed is the same. The air forces are then proportional to U^2D^2 where U denotes the tip speed and (*Continued on page* 146)

P. & A. Photo.

WITH THE FORD TOUR

By Ralph W. Cram

ABOARD Bellanca No. 14, approaching Terre Haute, September 25—"Gee whiz!" as "Pop" Cleveland says when he gets real mad; it has just occurred to me that if this dispatch is to be found in the October AERO DIGEST, it will have to be written *Now*. So the portable typewriter has been unlimbered, and certain facts must be set down between the bumps that mark the progress of the 1930 National Air Tour at an average of 140 per, toward the next stop.

The first fact which stands out so prominently that all the ninety pilots and passengers, mechanics, technicians, news writers, and others in the competing and accompanying planes are agreed upon it, is that this is no longer an Air Tour but an *Air Race*.

For two or three years after Mr. Edsel B. Ford offered the trophy which nineteen of these thirty planes are competing for, the resulting air tours were nice, comfortable cruises. As efficiency tests they were a success, more or less. Weak points in engines and planes were revealed. The formula yielded a figure of merit for the various planes which indicated who, with reasonably good flying, would be the winner before the competing ships ever left Detroit. Two or three pilots had a chance and put up

B. Stevenson

J. B. Story

Leslie Bowman

Art Davis

The Edsel B. Ford Trophy

Eddie Schneider

Walter Carr

J. Livingston

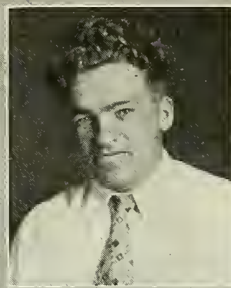
Harvey Mummert


Major Wm. Robertson


Major J. C. Cone


L. D. Ruch


J. Wesley Smith


Harry L. Russell

a semblance of a race; a good-will cruise followed, which has served many good purposes, and a fine time was had by all.

But this year it is different. Everybody knew that if John Livingston or Art Davis made the best scores with their Wacos this time, the Waco company would have the trophy for keeps, having already two wins to its credit. So there has been an easily sensed determination on the part of other pilots to turn in a better score this year than either John or Art. The scoring formula was revised so as, it was hoped at least, to give everyone a chance, and every pilot who had any show at all for the big trophy or the prize money went after it in deadly earnest. Personal friendship stood the test, but professional friendship ceased when Pop dipped the starter's flag at Detroit and the planes were off for their 5,500-mile race.

Why, "they say" that some of these planes were built on purpose to win this race. Certainly a lot of them were powered and pepped up and streamlined as never before. Even the big trimotored Fords, which had never before been serious bidders for or defenders of the trophy, were among the speediest planes on the cruise. For instance, Myron Zeller's No. 5 steamed into Casper, Wyoming, the other day at the end of a 275-mile leg done at 175.8 miles an hour. And everyone else, among the ten or so leaders at least, was trying as hard as Myron to get speed out of his ship. The new formula made every leg a race, and the pilots did the rest.

Harry Russell's Ford, powered with two Wrights and a Wasp, took the lead at the start, with a formula constant which helped it pile up points. Zeller's Ford gave it a race for a time, but was soon passed on the score-sheet by Davis and Livingston's Wacos and Walter Beech's Kingbird. Bellancas piloted by George Haldeman and Wes Smith were always bidders for good places, with young Eddie Schneider pushing up into the comfortable money with a chance of winning Great Lakes Light Plane Trophy.

The three-Wasp Ford and the Kingbird were having a pretty race for fourth place as the planes came down from Canada into the States, Walter holding it until his entry encountered difficulties. By that time the Ford was doing 250's and 270's per, according to the wind. When Walter's troubles began the Ford moved into fourth place and at Denver was ahead of the Kingbird 423 points. It was Fords and Wacos fighting for the top four places.

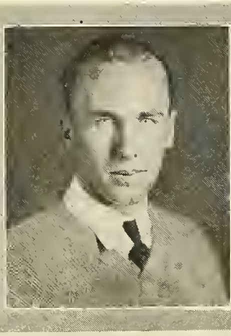
About that time the mountain crossings cut the speed of the lighter ships, and Smith's Bellanca took seventh place from the Cessna. Farther down the line the Monocoupe, a consistent gainer since it lost points by a forced landing back on the Wausau leg, passed the American Eagle.

Leading scores at Denver were: Ford No. 6, Harry Russell, 40,498; Waco 2, John Livingston, 38,332; Waco 4, Art Davis, 37,988; Ford 5, Myron E. Zeller, 37,566; Kingbird 9, Walter H. Beech, 37,053; Bellanca 13, George Haldeman, 36,688; Bellanca 14, J. Wesley Smith, 32,746.

From the interest shown in the tour, all through Western Canada, it appeared that whoever arranged the route of the cruise made no mistake when part of it was located above the northern border of the States. They have done a lot of flying up there, but most of the people had never seen a trimotored ship. So with the big Fords and the other interesting types the tour took into the Northwest, the touring planes made little less than a sensation.

Getting away from Detroit on schedule, the planes passed through familiar territory, to hospitable Kalamazoo, and thence to Curtiss-Reynolds Airport, scene of the recent National Air Races. Davenport, Iowa, welcomed the air armada the next noon, with the Exchange Club the luncheon hosts, in line with the club's national program of developing interest in aviation. It was the first time the tour had visited Davenport. The club had the Blackhawk Hotel cater for the luncheon at the hangar, and the old-timers said it was the best luncheon in Tour history.

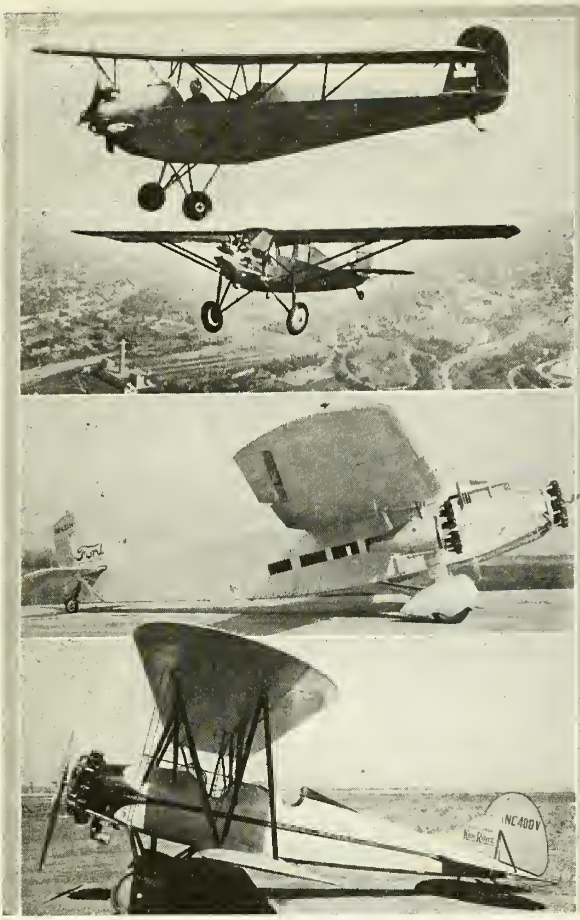

Truman T. Wadlow


M. E. Zeller


Geo. Haldeman


C. W. Meyers


Walter Beech



Airplanes entered in the Ford Tour—(Top to bottom)—American Eaglet with Szekely engine, American Eagle cabin plane, Ford trimotor and Rearwin Ken-Royce

Wausau, Wisconsin, whither the tourists flew from Davenport, has now entertained the fleet for three successive years. The airport there is a monument to Johnny Woods, who won the 1928 tour; and not to be air-minded in Wausau is to be treasonable to Johnny Woods' memory.

Eau Claire was the luncheon stop the third day, and then big doings began at Duluth. They made the tour's visit the main event of a two-day dedication of their fine new airport. It consists of 640 acres, with two 2,600-foot runways. All the notables of northern Minnesota, including Governor Theodore Christianson and "Speed" Holman, were there.

The leg from Duluth to Grand Forks was flown through much rain, with some effect on the scores. From the North Dakota town the flotilla of planes turned north to the border, beyond which they were to show their Canadian cousins what we are flying with in the States, and to learn a lot about air-minded Canada.

Canada had a royal welcome for the air tourists. They have been growing air-conscious up there beyond our northern border, at a rate that remained to be revealed by this new contact with their political and business leaders and their fliers. At Edmonton they even admitted to being "air-crazy"; and with 25,000 people paying admission to an air circus, with the tour planes as a headliner, at that city, it will be seen that their enthusiasm at least knew no bounds.

All three provincial premiers, the Hon. John Bracken of Manitoba, the Hon. Dr. Anderson of Saskatchewan, and the Hon. J. E. Brownlee of Alberta, with governors, lieutenant governors, mayors and other officials, headed reception lines at Winnipeg, Regina and Edmonton, or spoke at the dinners, or both. Everywhere Canadian hospitality was spontaneous and evidently sincere. Their flying clubs, with which last year's tourists became acquainted in eastern Canada, led in making the visitors welcome, and are playing a great part in multiplying the number of active fliers in the Dominion.

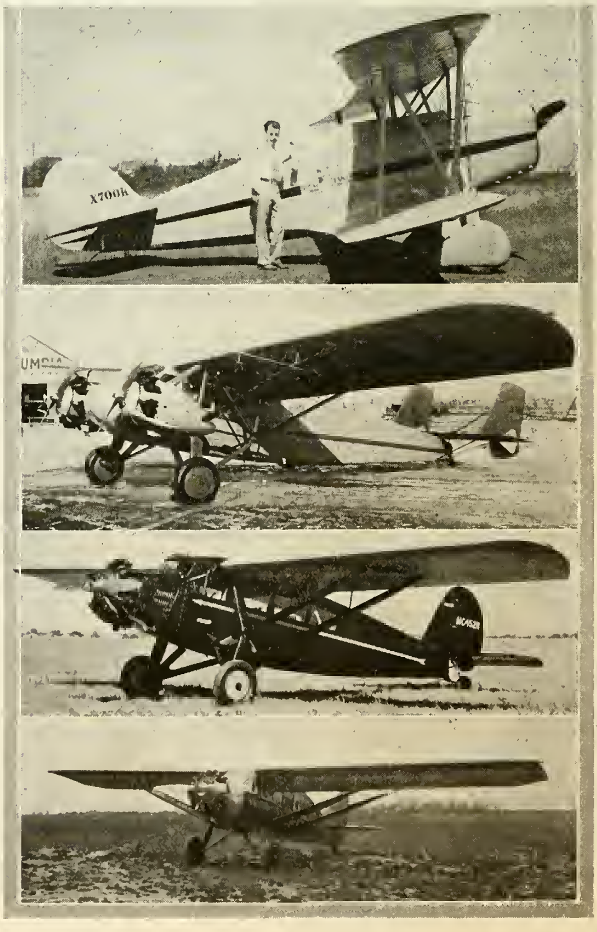
At Winnipeg we had our first contact with the spirit that made our trip across Canada so pleasant. Active young business men there had been assigned the job of being special hosts for each one of the tourists. Unless the arrangement slipped in some case of which I did not hear, every visitor had an entertainer who was individually responsible for his charge having a good time while there.

Up there on the Canadian prairies the wind frequently blows, but all were agreed that the sixty-five-mile wind against which we flew over 200 miles from Brandon to Regina was "most unusual." When the planes took off from Brandon after the luncheon stop, a gale was blowing which gave planes and pilots the hardest test of the six tours. All the planes made slow time, on the leg, and some of the lighter ones had to land for fuel. They straggled into Regina in the late afternoon, plucky Nancy Hopkins, flying her little plane alone, making as good a landing as the veteran fliers.

Next morning came the shortest hop of the tour—thirty-seven miles to Moose Jaw—and the planes made it in

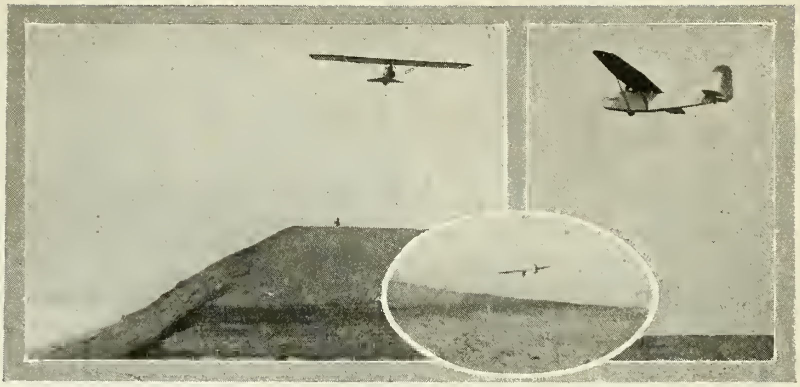
(*Continued on page* 146)

(Top to bottom)—Great Lakes, Twin-motored Curtiss King-bird, Travel Air monoplane and Bellanca monoplane



Glider Flying at Cape Cod

By R. E. Dowd



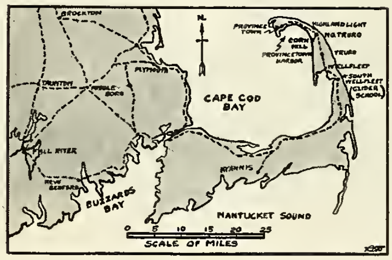
Ken Doe's "Cadet II" in flight over sand dunes at South Wellfleet; small view shows the Cadet II sliding along the ridge to gain lift from the rising current

WHEN the American Motorless Aviation Corporation announced the establishment of a glider school at Cape Cod in 1928, the aviation industry immediately began to speculate as to its possisibilities. To some it seemed a foolish venture; the glider was a plaything, a fad like Mah Jong, Ouija boards. Others openly questioned the value of the glider as a means of preliminary flight training. Still others saw great commercial possibilities. Thousands of students would flock to the school for training. It would be very profitable for the promoters. The general public received periodical reports through the press and newsreels as some new record was established, and gradually accepted the glider school as one of the Cape's many attractions, without knowing very much about it.

Three summers have slipped by since the school started, and it has been my privilege to spend the last two on the Cape in close contact with the glider camp activities. The interest in the project now seems to be possibly greater than ever, for each group of speculators mentioned seems to feel that his predictions have materialized in one way or another. Whenever a discussion starts on the subject of gliders, Cape Cod is invariably mentioned as proof of this or that contention. This is the more lamentable when one discovers how few people really know what the camp actually is, where it is located, how it can be reached, and what its facilities are. In view of all this, I have been urged many times to explain my impression of the project as gathered during my visits to the camp. Hence this effort, which is, incidentally, quite independent of the management of the school, the only object being to disseminate information of general interest to the aircraft industry.

Geographically Cape Cod is a long narrow peninsula, a part of the state of Massachusetts, extending first easterly and then northerly from the mainland at a point some fifty miles south of Boston. The general outline of the Cape, as may be noted from the sketch, has been compared to an arm, bent at the elbow and terminating in a clenched hand, represented by Provincetown. From the Canal, which separates the Cape from the mainland, the length of the arm is approximately sixty miles. Roads are improved for motor car travel, and railroad transportation is available right through to Provincetown. The Cape is delightfully quaint in its homes and public buildings, and the natives are cordial and interesting.

The glider camp, consisting of two large fire-proof hangars, repair shops, barracks, mess hall, shower baths, tents and cottages, is located at South Wellfleet about fifteen miles from Provincetown on the easterly side of the Cape. For many miles this shore line rises some 100 to 150 feet above the ocean. At the camp site the landscape is particularly clear of vegetation. White sand and wind swept dunes are everywhere in evidence at this section of the Cape, but at South Wellfleet acres and acres of soft, yielding sand are to be found, making the spot ideally suited for training purposes. Low, rolling sand dunes permit take-offs in almost every direction.



Map showing Cape Cod peninsula

At low tide the beach is perhaps 150 feet wide with a moderate slope, but at high tide it is not wide enough to land a glider without including an involuntary ducking for the pilot.

As may be noted from the map, favorable winds for soaring on the easterly side of the Cape are east and northeast, although wind directions slightly south or due east may be used if sufficiently intense. Soaring flights have been made from the camp as far north as Highland Light. In fact, landings have been made at this point and return flights have been effected. This distance is some ten to twelve miles.

The longest durations, however, have been made on the westerly side of the Cape, where the best winds are from the southwest. The starting point is Corn Hill at North Truro, about nine miles from South Wellfleet. No hangars have been erected on this site to date. The practice has been to transport the soaring gliders on trailers from the camp to be set up at the launching point. The soaring course is some three or four miles northerly from Corn Hill, which has an altitude of approximately 150 feet. It was on this site that Peter Hesselback made a duration flight of four hours and five minutes in 1928 with the imported Darmstadt glider, later wrecked by colliding with a flag pole. At low tide an exceptionally fine beach is available for landings, but as on the east shore, this reduces to a rather narrow strip at high tide.

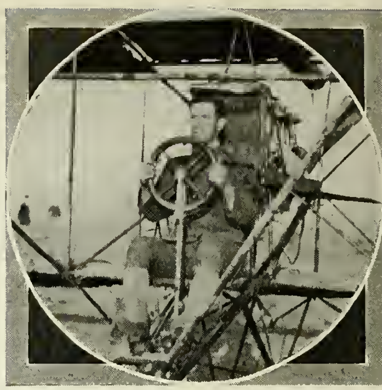
The entire Cape has an interesting early history, dating back to the Pilgrim days. Indeed, there are historians who believe that Provincetown rather than Plymouth was the first landing place of the *Mayflower*. Legend has it that Corn Hill was so named because the early settlers found Indian corn and a kettle buried for winter use in a sand mound. It is of some significance that this exact site should become famous in the

(*Continued on page* 170)

Students show a keen interest in the Baker-McMillen Cadet II glider which visited Cape Cod for a few days

ECONOMIC VALUE OF FLYING BY INSTRUMENTS

Captain William C. Ocker, *U. S. Army Corps*

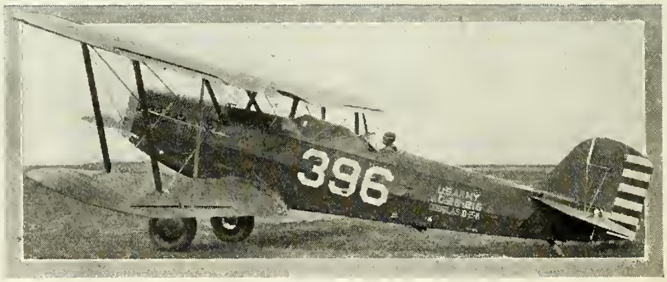


Captain Ocker learned to fly in the days before instruments were standard equipment on airplanes

MARK TWAIN'S famous remark that many people complain about the weather but no one seems to do anything about it, is not strictly true. Of course, the weather itself cannot be regulated which is perhaps fortunate. Much has been done, however, to mitigate and alter the effects of the weather. Witness, for example, the electric fan, the refrigerator, the rain coat and the umbrella.

The weather has always been a particularly important topic of conversation among fliers. There are, no doubt, a great many pilots today who remember when a flag or wind cone atop the hangar was carefully watched in order to determine whether or not an airplane flight was practicable that day. Since those early days, however, flying equipment has been improved to such an extent that flight is now practicable during conditions of very high and turbulent winds.

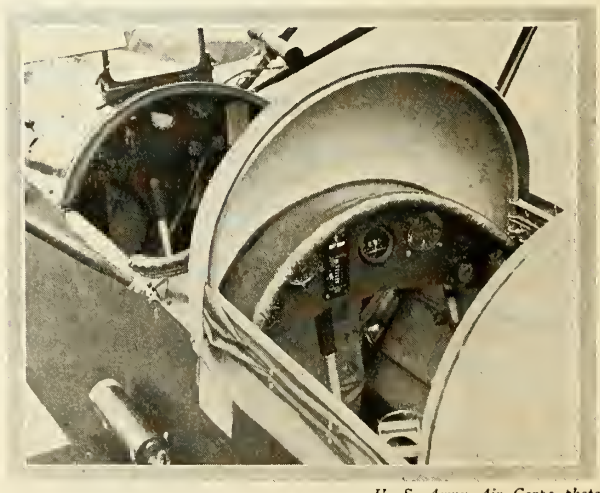
Although airplanes are sufficiently strong to withstand high wind, there are other features of the weather that play an important part in the economic value of the airplane as a means of transportation. If the full potential value of air transportation is to be realized, the airplane must do more than fly great distances in a short time under favorable conditions. What is even more important, it must be able to operate safely and consistently on regular schedule. One of the great advantages of rapid transportation by air will be lost if scheduled flights are too frequently delayed because of weather. The airplane must leave on time and arrive at its destination on time if public confidence is to be built and if profits are to be forthcoming. The aircraft as a common carrier not only must be safe, but must be as dependable as railway and water services are. Since aircraft travel great distances in short periods of time, it is only natural to expect that at some place along these extended airlines bad weather conditions will be encountered.



Douglas Observation plane equipped with hood for blind flying

Without highly developed blind flying methods, it is necessary to delay or cancel scheduled flights when conditions of fog, low clouds, or rain exist along the route. And considering the equipment of most airplanes at present, the delay of flights under such conditions is evidence of discretion. The time is coming, however, when flights will be made safely in inclement weather, when the full benefits will be derived from the operation of aircraft as a common carrier.

The removal of the limitations imposed by weather is dependent upon two principal factors—the development of suitable instruments for flying during conditions of low or obscured visibility, when the pilot cannot refer to ter-



U. S. Army Air Corps photos

A Consolidated training plane with blind-flying hood raised and lowered

restrial objects to keep his ship level; and the education of the pilot in the use of proper instruments. Numerous fatal accidents have resulted from the pilot's inability to use suitable instruments. As the result of trying experiences and fatal accidents, some pilots have come to the conclusion that the weather is an insurmountable barrier to safe flight and have been content to dismiss further research. Other pilots and experimenters, with a wealth of practical experience to their credit, however, have not been disposed to forego study of this problem and have set out with a determination to break down this last real obstacle to consistent, safe flying.

For several years Major Meyers of the Flight Surgeons Department, Medical Corps, and I have been working together for a solution of that all important factor in bad weather flying—the education of the pilot in matters that pertain to his mental and physical characteristics. We have endeavored to prove that the average pilot is unaware of his own reactions to stimuli of flight, that his safety depends upon the thorough understanding of all his reactions while he is flying through fog, clouds, etc., when his only visual reference is instruments inside the cockpit of his airplane.

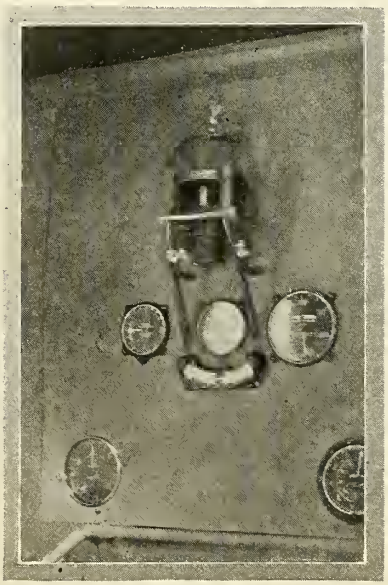
A Barany chair for blind flying tests

We have approached this problem of instrument flying from the pilot's point of view, and the results of our study are said to have fostered the interest now being taken in what is known as blind or instrument flying. In the Seventh Annual Report of the National Advisory Committee for Aeronautics, in a discussion of instruments and related problems in Report 125, the human factor that enters into the use of flight instruments is very well explained. The point is brought out that, after all, a flight instrument is no better than the pilot's interpretation of it, and consequently, this human factor plays an all important part in the use or application of instruments for the purpose of flying during bad weather.

One of the principal difficulties in flying blind is that the pilot experiences certain fatiguing stimuli, which make for hazardous flight because the efficiency of the person is enormously reduced. This fatigue is the result of a number of causes and subcauses—principal of which is a physical disturbance of the pilot's normal sense of equilibrium while he is flying by the indications of instruments. The second cause is a mental condition of strain and the continuous necessity of fast, accurate thinking.

Let us first consider the physical cause of fatigue known as vertigo. Vertigo is a condition which evidences itself as confusion in the matter of sense of direction and position with respect to the earth. A number of illusions obtain in the human machine that are not possible of interpretation. For example, it has been demonstrated that after accelerations, either angular or linear, a man cannot competently interpret the movements of his body unless he can see some plane of reference such as the earth or objects stationary in relation to it. With the aid of the Barany Chair we have apparently demonstrated that these illusions do exist in the normal individual. By turning a blind-folded person in the chair at a constant rate of speed for a few turns and then momentarily reducing the rate of speed, the subject imagines he is turning in the opposite direction. These illusions exist in the air also, but they are more complicated because of the increased number of planes of motion that the airplane is capable of moving in. When these illusions, the result of vertigo, obtain in the air, the pilot follows them unless he has been trained to disregard them. While flying without outside visual reference, even though with reliable flight instruments, the untrained pilot frequently reverts to his sense of feel or balance and controls the airplane in response to erroneous impulses. The result is too often disastrous. The pilot properly trained to fly by instruments alone is still handicapped by vertigo, although he is able to counteract this effect by relying on the instruments supplied for his guidance. Yet the pilot's reaction to this very physical stimulus of vertigo caused by the workings of the inner-ear is one of the principal factors producing fatigue while flying blind.

That portion of fatigue associated with mental or phychological conditions may be explained as follows: Normally at least three instruments are placed on the instrument board in the pilot's cockpit to supply him with necessary information for conducting his flight when he is deprived of outside visual reference. Usually the instruments he watches bear little resemblance to the things he sees while flying in clear weather. These instruments indicate such conditions as direction, rate of turn, the angle and rate of climb, and the lateral position of the aircraft. They do this in a manner that requires interpretation on the part of the pilot. This interpretation of instruments is a tiring intellectual process, for there are very few subconscious reactions on the part of the pilot to instrument indications.



Blind-flying instruments in a cabin plane

In order to overcome this type of fatigue it has been proposed to develop an instrument which will give the pilot all the necessary indications in a manner closely approximating the conditions met with in normal flight during clear weather. At the same time it has been proposed that this instrument include an element for the elimination of vertigo. Lieut. C. J. Crane and I have collaborated to devise such an instrument. This instrument, known as the Flight Integrator, incorporates the necessary indications of instruments in one indicating face and thereby eliminates both kinds of fatigue.

AIRPORT AND AIRWAY

Disturbing Suburban Peace

THE complaints of suburban residents that airplanes flying from nearby fields are becoming a public nuisance because of the noise they make, cannot profitably be ignored. Whether or not such protests are entirely justified is not as important as the fact that they represent the attitude toward flying of a portion of the nation's population comprised of potential air transport patrons. Those who reside in the suburbs of most American cities belong to the upper middle class; they are people who have occasion to travel more or less often, men and women who can afford to pay the slight extra cost of going by air. If, however, their domestic tranquility is disturbed by the roar of low flying planes —if by this irritation they build up an indestructible prejudice against aviation—the probability of their payng passage on air-lines is lost, for the present at least.

The average individual who establishes his home in the suburbs does so principally because he wants to relax in peace and quietude after the nerve-racking turmoil of the day's work in the city. If the rest he seeks is interrupted at too frequent intervals by the noise of airplanes—"contraptions" he doesn't trust much anyway—he's not apt to have much affection for the source of his annoyance. And he's likely to overlook any advantages he might derive from using air transportation.

Although it is not practical in the present stage of development of airplanes, propellers and engines to eliminate noise entirely, it certainly is highly desirable to mitigate its irritating effects on those who reside below. It doesn't matter that the sound of low-powered aircraft engines is actually less raucous than that of speed boats; it carries little conviction to argue that heavy trucks are more thunderous than airplanes. To the average man in his home aircraft noises are more annoying than those of the vehicles he is accustomed to hearing in the street outside, and no amount of reasoning will make him feel otherwise.

For the welfare of the industry, therefore, we are duty-bound to appease the layman as much as possible. If we cannot yet produce a relatively silent airplane, we can at least under normal circumstances fly over residential areas at sufficiently high altitudes to be out of hearing from the ground. In England, where this same problem has arisen, the Air Ministry is conducting tests with various types of planes and powerplants to ascertain at what heights different ships can fly without disturbing those below. Apparently this British action is being undertaken with a view to regulating the levels at which planes may fly.

In this country we would err seriously were we to follow British example in *requiring* aircraft of one type to maintain an altitude of more than 1,000 feet; those of another type to stay above 2,000 feet; still another, 2,500 feet, and so forth. Too many complicated regulations must inevitably retard the growth of aviation—particularly private flying.

Yet, without imposing any laws or prohibitions, the Department of Commerce could supply useful information by undertaking experiments similar to those of the British Air Ministry, and suggesting—not demanding—that planes of various classes fly over cities and suburbs at appropriate relative altitudes.

Of course, when ships are taking off and landing, this consideration for nearby residents cannot be practiced. But since the number of persons living in the immediate vicinity of airports is negligible compared to the total urban and suburban population which might be affected by general low flying, we can accomplish a great deal by respecting the peace of the majority. And in the meantime, we can continue research in developing quieter engines without sacrificing power.

Hangar at the new Bay airdrome, six minutes from either San Francisco or Oakland

Airport Profits from Strictly Airport Activities

IN many quarters the notion prevails that airports can be operated at a profit only if they assume the attractions of an amusement park. In some localities—particularly where too many air terminals for present needs have been built in one community, or where there is still little aeronautical activity—it is undoubtedly difficult to obtain much revenue by operating air-fields strictly as such. At some of these places, too few airplanes land for service and storage to provide sufficient funds even for the maintenance of facilities, let alone the payment of interest on investment. Consequently, it is not to be wondered that the managements of such airports have grasped any and every legitimate means to save themselves from permanent burial. With the result that miscellaneous concessions—frequently quite unrelatedto aeronautics—have sprouted forth at flying fields throughout the country. Administration buildings have become popular dance halls; unutilized spaces have been rolled and dipped and tunneled into Tom Thumb golf courses; normal, sane flying activities have degenerated into hazardous stunts, wing walking and parachute jumps—all for the purpose of enticing crowds and thereby defraying the expenses of operating a haven for aircraft.

As I have suggested, there is sometimes adequate reason for this perversion of the primary function of airports. Altogether too often, however, recourse to such methods is necessary not because of any inexorable circumstances, but because of poor management. And in the latter lies the real danger of this trend in airport affairs.

Poor management is likely to become misdirected management; the terminal intended for aircraft operations is apt to become unalterably a three-ring circus enterprise; and the dignity that instills confidence is liable to be obscured forever by a street carnival atmosphere. The airport which at present is not much more than a roadhouse, is building for itself a reputation that will be hard to live down in the years when catering to air traffic becomes the more lucrative occupation. The easy solution of today's problems may dissipate for the future every advantage of being a pioneer in air transportation.

There is a persistent fallacy that it is impossible either to make profits on an airport or even balance income evenly with expenses. And too frequently, I fear, that idea has thwarted the introduction of the kind of efficiency which could disprove it. Notwithstanding, there are a few fields which are returning profits, and perhaps the most notable of these is Tulsa Municipal Airport, of which Mr. C. W. Short, Jr.,

COMPARATIVE INCOME AND OPERATING STATEMENT, TULSA MUNICIPAL AIRPORT

Income	*May*		*June*		*July*	
Gasoline sales	$4,299.49	....	$3,809.92	....	$4,736.94	....
Less costs	2,546.53	$1,752.96	2,953.66	$ 856.26	2,734.17	$2,002.77
Oil sales	544.40	....	453.80	....	571.05	....
Less costs	313.72	230.68	119.59	334.21	329.08	241.97
Hangar income	....	564.50	....	506.50	....	546.50
Service—parts—supplies	96.47	....	98.85	....	121.65	....
Less costs	87.37	9.10	51.55	47.30	37.61	84.04
Income pilots' hotel	....	200.00	....	254.35	....	275.65
Leases and operations	....	814.00	....	965.50	....	790.00
Miscellaneous income	....	46.07	....	74.00	....	128.50
Total		$3,617.31	....	$3,038.12	....	$4,069.43
Less Expense						
Office salaries	$400.00		$360.00		$360.00	
Nightwatchman salary	140.00		112.00		112.00	
Pilots' hotel keeper salary	65.00		65.00		65.00	
Labor; mec., hangar and field	895.90		748.25		647.00	
Heat, light, gas and water	104.83		69.52		67.21	
Telephone and telegraph	18.75		52.15		63.83	
Stationery and printing	29.87		1.05		15.47	
Auto and truck	86.40		26.03		33.70	
Freight and drayage	3.80		8.06		2.34	
Repairs, maintenance buildings	17.08		4.75		1.65	
Repairs, maintenance equipment	....		......		5.75	
Advertising	26.00		......		......	
Postage	....		6.00		11.00	
Maintenance field	14.00		91.75		39.50	
Meteorological department	13.45		27.80		3.50	
Pilots' hotel expense	32.08		38.58		25.45	
Miscellaneous expense	52.09	$1,899.25	34.39	$1,645.33	75.30	$1,528.70
Net Profit Before Depreciation		$1,718.06		$1,392.33		$2,540.73

Total Profit for the Three Months—$5,651.12

is manager.

In studying the itemized balance sheet of this port for May, June and July, I could discover no income derived from anything which might be construed as an extra-aeronautical activity. Yet, for that period of three months, Tulsa's ledger showed a net profit, before depreciation, of $5,651.12. This unusual financial condition has been brought about by the adoption of a set of rates and charges which is satisfactory to the operators of airlines and private planes, yet allows the airport a reasonable profit. Needless to say, however, rigid economy of operation and management has been necessary. Much of this success is the result of the ability of the management to give satisfactory service with a minimum number of employees.

Traffic, of course, is essential to the financial success of any airport. Fortunately, Tulsa is so located geographically that it is recipient of an all-year-'round trade that is probably equal to that of any other city in America. According to Mr. Short, approximately ninety per cent of the planes flying between Eastern and Western cities put in at Tulsa for fuel or service. This transient traffic naturally boosts gasoline and oil sales, which furnish nearly half of the yearly income.

In addition to transient traffic, Tulsa enjoys a tremendous volume of scheduled operations. Five important airlines use Tulsa Municipal Airport either as a base or as a terminal point. The total number of scheduled planes amounts to thirty-six daily. The result of these extensive operations has shown up on the airport's traffic records, on which are kept accurately the number of persons arriving and departing by air. For instance, in January, 1930, when the country was gripped by severe snows and winter storms, the Tulsa airport recorded 7,373 persons arriving and departing by air. In March, 9,209; in April, 9,264; in May, 10,012; in June, 11,009; and in July, 10,135.

Returning to the financial statement for May, June and July, a noticeable decrease may be observed in overhead for the months of June and July. This curtailment was entirely the result of a careful study of expenditures and a consequent reduction of costs in various departments. At Tulsa, the departmental method of operation has apparently proved especially effective in checking up on increased overhead whenever it appears. Crew chiefs are in charge of and entirely responsible for their respective departments—whether service, storage, accounting or traffic—each keeping his income and expenses separate so that inspection discloses any irregularity which may occur.

When in January, 1930, an audit was made for the last nine months of 1929, it was found that the total income of Tulsa airport amounted to $96,000; the net profit before depreciation and investment, $23,000; and the net profit after depreciation and investment, $6,500.

It is not logical to believe that Tulsa's enviable record cannot be duplicated elsewhere. No doubt this Oklahoma terminal has advantages in geographical situation and regional enthusiasm for aviation which do not obtain in many other parts of the country, but its greatest asset is good management. And that is a factor which can be applied everywhere.

Airport operation is not a get-rich-quick proposition; rather, it is a business enterprise which offers substantial returns only over a long period. But even in these pioneering times, it can be made self-supporting by careful and efficient management, and in future years of greater prosperity, it can be made profitable by the same means. We must not be impatient; we must not allow the primary purpose of serving aircraft to be side-tracked simply because it is impossible at present to reap a rich reward from that activity.

What Price Restrictions?

THE edict of the State Board of Commerce and Navigation of New Jersey that aircraft "will not be permitted to land on any New Jersey inland waters" is, it seems to me, an example of that brand of impetuous action which is the offspring of ignorance and superstition. The New Jersey officials apparently regard the science of human flight much as the New Englanders of old looked on witchcraft. To them it is something to be abhorred, condemned and crushed; something supernatural which foredooms disaster wherever it appears. It hasn't occurred to these gentlemen that anyone who flies an airplane for pleasure or profit can still be a normal human being. Nor do they seem to realize that, by all the ideals on which the nation was founded, a man has as much right to fly as to go boating, if he prefers. Who can justly or logically give surface craft priority over aircraft in the use of inland waters?

It all came about this way. Frank A. Morgan of Nolan's Point, Lake Hopatchong, had applied to the board for permission to operate a five-passenger amphibion between Nolan's Point and New York and to set off a portion of the lake area for landings. In deciding to refuse the petition, the board

(*Continued on next page*)

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decided to extend the prohibition to all other lakes as well. The ruling held that aircraft flying from water "constitute a menace to surface navigation."

The stupidity of this attitude would not be so striking if the ruling were less universal in application. No doubt there are a few lakes in New Jersey where the operation of airplanes might conceivably inflict a hazard overbalancing any public or private interest it could serve. And no honest sponsor of aviation's cause would deny that regulations would be justified at such places. To prohibit planes to land on *any* inland lake, however, is as sensible as it would be to forbid pedestrians to cross *any* street because the latter was being used by motor cars.

The State Board has evinced a startling lack of appreciation of the potentialities of aviation. It apparently overlooks the fact that New Jersey's inland lake resorts will grow only in the proportion that they are made more accessible; that the airplane makes it easier to spend leisure moments in the country without interrupting business in the city; that if people cannot live and travel as they like in New Jersey, they will go elsewhere. The members of the board must depend on tabloid scare-heads for their knowledge of modern civilization, else they would not act as if the airplane were a contraption suitable only for doing circus stunts, crossing the Atlantic, and dealing destruction to man's work on earth. If they had any insight to relative values in the realm of transportation, both in peace and war, they would not disregard aviation's status as an industry which, for the sake of national defense and the stimulation of commercial enterprise, must be encouraged—not handicapped by ill-founded state regulations.

The excuse that the action was necessary for the protection of other craft using the lakes crumbles under any reasonable analysis. If accidents involving surface vessels and aircraft were numerous, the argument might be more tenable. But the fact remains that they are not so frequent as to cause much apprehension. On the contrary, the use of an airplane is an asset to the boat owner, for it makes it possible for him to enjoy the use of his boat more conveniently and more often. True, the conservative inhabitants of summer resorts will be slow in accepting flying. But after all, are their lives or property seriously endangered by the landing and take-off of planes in the neighborhood? I cannot believe, by any stretch of imagination, that they are exposed to much greater risk than when they ride the highways or start a fire in their furnaces for the winter.

Fortunately, the aeronautical industry is mobilizing its phalanxes to fight this thing to the last ditch. It cannot afford to let this invasion of its rights stand unchallenged and, now that the battle is on, it cannot honorably retreat until a complete victory is won.

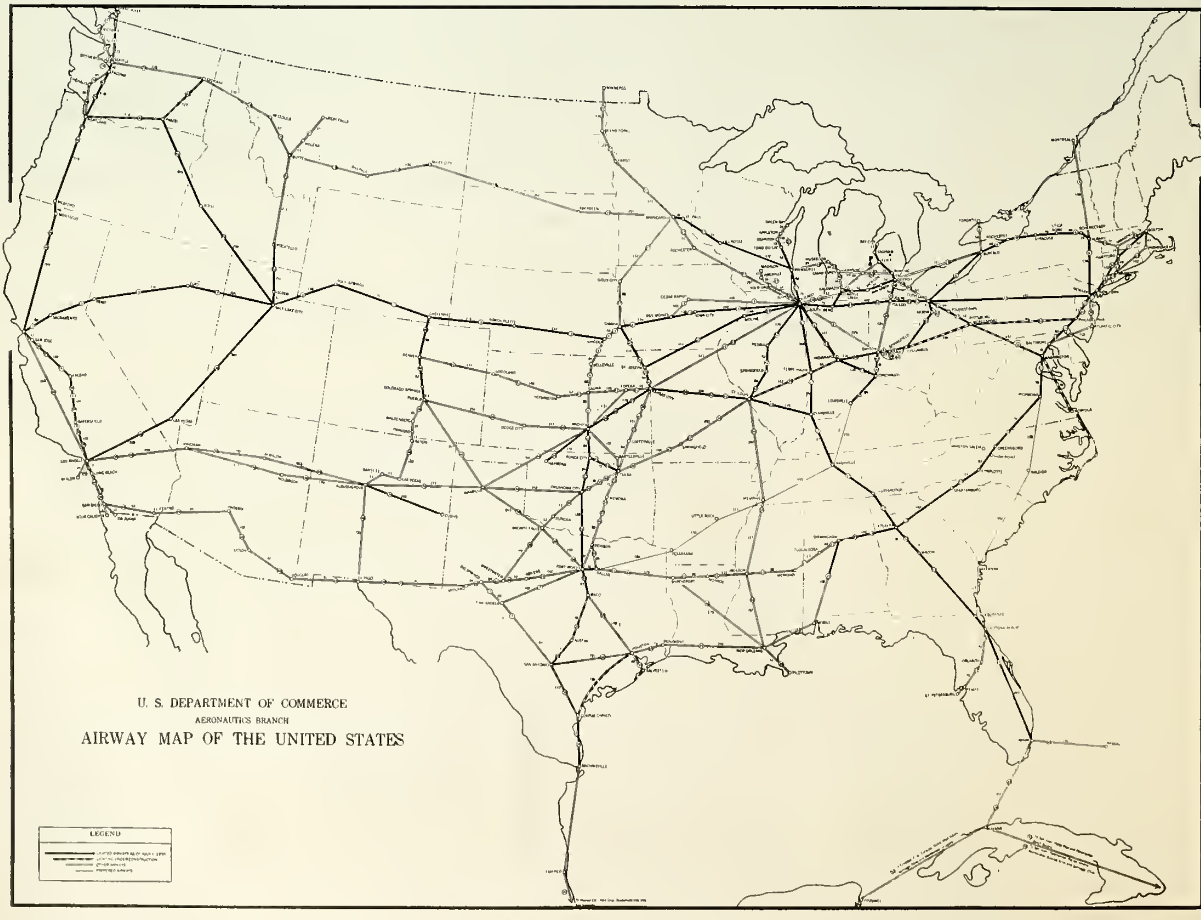
—Robert B. Renfro.

Current Air Transport Facts

TWENTY-NINE major American airlines flew a distance equal to 430 times around the world at the equator during the first six months of 1930, carrying more than 133,000 passengers and 3,000,000 pounds of mail, according to the Aeronautical Chamber of Commerce. The total distance flown was 10,725,335 miles. In June, 2,230,763 miles were flown in a single month.

During April, May and June the twenty-nine airlines completed 97.3 per cent of the mileage scheduled, and improvement over the record of eighty-five per cent completed during the first quarter, when weather conditions were less favorable.

The lines carried 88,074 passengers during the second quarter and a total of 133,005 during the first six months of the year. Each month showed a gain of several thousand passengers over the preceding month.



Map of the network of air transport lines operating in the United States, recently issued by the Department of Commerce


GOODYEAR
AIRWHEEL

(*Continued from preceding page*)

During the second quarter, the average distance traveled per passenger was between 275 and 290 miles.

During the first six months these lines carried 3,125,057 pounds of mail. During the second quarter, 1,809,109 pounds were carried, an increase of more than 500,000 pounds over the first quarter.

Express carried during the first six months totaled 137,398 pounds, of which 82,165 pounds were carried in the second quarter.

There was a marked increase in the number of hours of service which the average airline transport plane saw during the month of June, as compared with January or February. The average trimotored plane was in the air 95.6 hours during June, as compared with 56.1 hours in February. The increased hours of service were proportionately the same for other classifications of airplanes.

The 315 planes reported in service by the twenty-nine airline operators consumed 4,737,946 gallons of gasoline and 144,678 gallons of oil during the first six months.

Single-engined landplanes still predominate as airline equipment, comprising 67.6 per cent of all the ships on the transport lines. Trimotored planes accounted for 22.2 per cent, and the remaining 10.2 per cent was about evenly divided between seaplanes and amphibions.

Thirteen planes were retired from service during the six-month period and twenty-seven new planes put into operation. The air-cooled engine still predominates, accounting for 96.15 per cent of the 675 engines in use.

DURING August, passenger traffic on the Stout Air Lines between Cleveland, Detroit and Chicago showed more than 100 per cent increase over August, 1929. In August of this year, 3,492 passengers were carried, as compared to 1,578 carried in August, 1929. Of this total, 1,669 passengers were carried on the Detroit-Cleveland division and 1,823 on the Detroit-Chicago division.

Since January 1st, 19,761 passengers have flown on the Stout lines, as compared to 5,892 passengers carried during the first eight months of last year.

Stout Air Lines have purchased four new high speed Ford trimotor transport planes for passenger service.

AMERICAN Airways, Inc., transport subsidiary of The Aviation Corporation, carried 109,467 pounds of air mail over its various lines during the month of July, as against 103,219 during June, an increase of 6,248 pounds.

The revenue increase of American Airways for the month was $10,178.98.

WITH the addition of the August total of 5,169 passengers, 25,213 persons have been carried on the TAT-Maddux Air Lines this year.

The August total of 5,169 is an increase of 120 over the July. Passengers carried on the transcontinental divisions alone numbered 2,571, nearly 2,000 more than were carried on the same divisions in August, 1929.

Planes of the TAT-Maddux lines flew 208,254 air miles in August without any mechanical interruptions to schedules.

PURSUANT to the recommendation of the Interdepartmental Committee on Civil Airways that a Southern Transcontinental airway be established, and as a result of the action of that body in determining the route to be followed by the air mail, the Aeronautics Branch will undertake construction of the airway from Birmingham, Alabama, to San Diego, California, via Fort Worth, El Paso, Douglas, Tucson and Phoenix.

That portion of the airway from New York to Birmingham, via Richmond and Atlanta, already is lighted and in operation. From Birmingham, the airway will be routed west to Dallas. This section will be equipped for day operations only.

From Dallas, the airway will extend west to Fort Worth and will pass through Abilene, Sweetwater, Big Springs, Midland, Wink and El Paso. This section will be equipped for night flying.

From El Paso, the airway will be routed to Douglas, Tucson and Phoenix, thence southwesterly to Wellton, thence west via Yuma and El Centro and thence due west to San Diego, where it will join with Pacific coastwise airways. This section also will be equipped for night flying.

IN AUGUST, Gulf Coast Airways, Inc., division of Southern Air Transport, established a perfect record of scheduled miles flown between New Orleans and Atlanta and between New Orleans and Houston on Contract Air Mail Routes No. 23 and No. 29, respectively.

On Route 29, between New Orleans and Houston, the number of miles flown was 19,778. On Route 23, between New Orleans and Atlanta, the mail-carrying planes covered 29,946 miles. This mileage was flown without a single forced landing because of motor failure or weather.

PASSENGER traffic more than tripled in the second year of operation of the St. Louis-Chicago air passenger line of Universal Division, American Airways. A total of 7,025 passengers was carried over the route during the past fiscal year, whereas 2,059 were carried the first year's operations.

The passenger total of 2,336 for June and July alone of this year surpassed the initial year's passenger figure.

Passenger planes on this route last year completed 1,476 trips, flying a total of 393,461 miles, an increase of 136,017 miles over the previous year.

SCHEDULED AIRWAY OPERATORS

Route No	Operator	Routes Operated	Route Mileage	Class of Service
1	Alaska Washington Airline	Seattle to Victoria	74	P
		Seattle to Vancouver	123	P
		Victoria to Vancouver	62	P
2	Barnes & Gorst	Seattle to Victoria	74	MP
3	Boeing Air Transport	San Francisco to Chicago (via Lincoln)	1930	MPE
		San Francisco to Chicago	1932	MPE
4	Browers Air Service Corp	Wichita to Omaha	346	P
5	Capitol Airways, Inc	Indianapolis to Chicago	161	P
6	Colonial Airways, Inc	Cleveland to Albany	446	ME
		New York to Boston	192	MPE
		Buffalo to Toronto	58	P
		New York to Montreal	332	MP
7	Cromwell Airlines, Inc	San Angelo to Dallas	232	P
		San Antonio to Big Springs	266	P
8	Continental Airways, Inc	Columbus to Chicago	295	P
9	Continental Air Express, Inc	Los Angeles to San Francisco	372	P
10	Davis Air Lines, Inc	Birmingham to Atlanta	140	P
11	Dalta Air Service	Dallas to Birmingham	610	P
12	Eastern Air Transport Corp	Atlanta to New York	793	M
		St. Petersburg to Daytona Beach	147	M
		Miami to Atlanta	616	M
13	Eastern Air Express, Inc	Washington to New York	216	P
		New York to Albany (via Springfield)	195	P
		New York to Boston (via Providence)	195	P
14	Embry-Riddle Co	Cincinnati to Chicago	261	MPE
15	Ford Airways	Detroit to Buffalo	217	E
		Detroit to Chicago	261	E
16	Gorst Air Transport, Inc	Seattle to Bremerton	15	P
17	Interstate Airlines, Inc	St Louis to Evansville	145	M
		Atlanta to Chicago	623	M
18	Kohler Aviation Corp	Milwaukee to Grand Rapids	119	P
19	Mamar Air Transport	Spokane to Seattle	228	PE
		Twin Cities to Spokane	1210	P
20	Mason & Dixon Airlines, Inc	Cincinnati to Detroit	237	P
22	National Air Trans Co Inc	Chicago to New York	717	ME
		Tulsa to Ponca City	72	ME
		Kansas City to Chicago direct	411	ME
		Dallas to Kansas City (via Tulsa)	457	ME
		Dallas to Chicago (via Wichita and St Joseph)	1009	ME
23	National Parks Airways, Inc	Salt Lake to Great Falls	483	MPE
24	New England and Western Air Transportation Co	Albany to Boston	149	P
		New York to Springfield (via Hartford)	124	P
25	New Orleans Air Line	Pilottown to New Orleans	74	M
26	New York Airways, Inc.	Atlantic City to Newark	97	P
27	Northwest Airways, Inc.	Milwaukee to Green Bay	120	MPE
		Chicago to Twin Cities (via Milwaukee)	391	MPE
		Chicago to Twin Cities (via Rochester)	359	MPE
		Twin Cities to Winnipeg	431	P
		Chicago to Madison	140	MPE
		Omaha to Twin Cities	320	P
28	New York, Rio, Buenos Aires Lines, Inc.	Buenos Aires to Mar del Plata Argentina	240	MPE
		Buenos Aires to Yacuiba, Bolivia	1090	MPE
		Rio de Janeiro to Buenos Aires	1190	MPE
		Fortaleza to Rio de Janeiro	1655	MPE
		Para to Fortaleza	690	MPE
		San Juan to Para	2062	MPE
		Buenos Aires to Montevideo	135	MPE
		Santiago to Buenos Aires	732	MPE
		Miami to San Juan	1445	MPE
		Miami to Habana	228	MPE
29	Pacific Air Transport, Inc.	Los Angeles to Seattle	1050	MPE
30	Pan American Airway, Inc	Santiago, Chile, to Montevideo, Uraguay	867	M
		San Juan to Paramaribo, Dutch Guiana	1342	MP
		Cristobal, C Z, to Curacao, Dutch West Indies	890	MP
		Santiago, Chile, to Cristobal, C Z	3731	MP
		Tampico to Guatemala City °	885	MP
		Brownsville to Mexico City (via Tampico)	472	MP
		Miami to Cristobal	2074	MP
		Miami to San Juan	1445	MP
		Miami to Nassau	185	MP
		Miami to Habana	228	MP
31	Pennsylvania Air Lines	Washington to Pittsburgh	192	PE
		Pittsburgh to Cleveland	118	MPE
32	Pittsburgh Airways, Inc	Pittsburgh to New York	336	P
33	Rapid Air Transport	Kansas City to Omaha	168	P
34	Robertson Air Service	New Orleans to St Louis	599	P
35	Southern Air Transport	San Antonio to Houston	191	PE
		El Paso to Dallas	574	PE
		New Orleans to Atlanta	480	M
		Houston to New Orleans	319	M
		Galveston to Dallas	318	MPE
		Brownsville to Dallas	546	MPE
		Oklahoma City to Tulsa	98	P
		Fort Worth to Tulsa via Dallas	272	P
36	Southwest Air Fast Express, Inc	Sweetwater to Tulsa	371	P
		Tulsa to St Louis	358	PE
		Tulsa to Kansas City	215	P
		Fort Worth to Tulsa (via Denison)	272	P
		Dallas to Tulsa (via Wichita Falls)	357	P
38	Stout Air Services, Inc	Detroit to Chicago	261	P
		Detroit to Cleveland direct	93	P
		Detroit to Cleveland (via Toledo)	152	P
39	T A T Maddux Airlines	Los Angeles to Columbus	1803	P
		Agua Caliente to Los Angeles (via San Diego)	130	P
		Los Angeles to San Francisco	372	P
40	Thompson Aeronautical Corp	Chicago to Kalamazoo	133	MPE
		Kalamazoo to Muskegon	80	MPE
		Kalamazoo to Bay City	151	MPE
		Kalamazoo to Pontiac	172	MPE
		Cleveland to Bay City	251	MPE
41	U S Airways	Kansas City to Denver (via Salina)	577	P
		St Louis to Kansas City	238	P
		Tulsa to Wichita (via Ponca City)	141	P
42	Universal Air Lines	St Louis to Chicago	273	MPE
		St Louis to Omaha	406	M
		Kansas City to Cleveland (via Chicago)	729	P
		Louisville to Cleveland	346	M
		Tulsa to St Louis	358	P
		Tulsa to Kansas City	215	P
43	Varney Airlines	Pasco to Seattle via Portland	322	ME
		Pasco to Spokane	127	ME
		Salt Lake to Pasco	525	ME
44	Wedell Williams Air Service	New Orleans to Dallas	457	P
46	Western Air Express	Los Angeles to Kansas City	1426	PE
		Los Angeles to Avalon	49	PE
		Pueblo to Cheyenne	199	MPE
		Agua Caliente to Los Angeles	130	P
		Los Angeles to San Francisco	348	PE
		Los Angeles to Salt Lake City	588	MPE
		Dallas to Amarillo	345	P
		Amarillo to Tulsa	341	P
		Amarillo to Pueblo	261	P
		Los Angeles to El Paso	805	PE
		San Francisco to Seattle	685	PE
		Kansas City to Denver (via Wichita)	682	PE
		El Paso to Denver	630	P
		El Paso to Dallas	574	P

M MAIL P PASSENGER E EXPRESS

PERSONAIRLITIES

BY

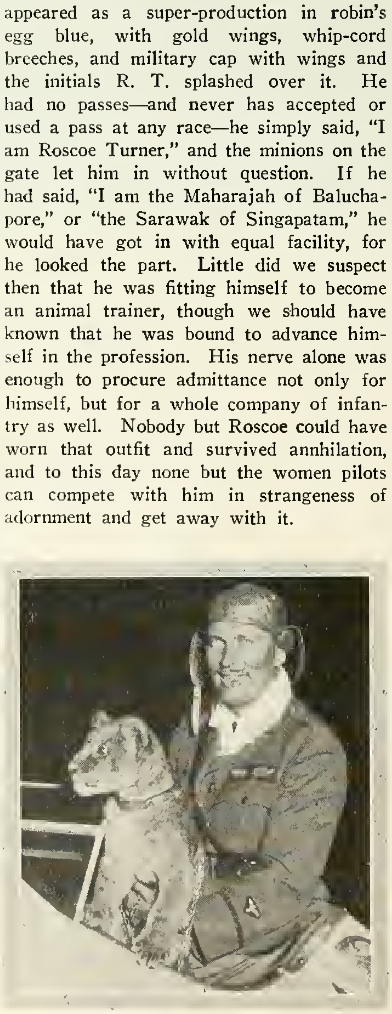
by Caldwell

WHEN a pilot wins a race, or comes in second or third, you'll encounter his name, and possibly his face, in all the papers. But if he comes in last, you'll search in vain for mention of him—nobody's informed he even was in the race. All of which is obviously unfair; for without the last man, and the two or three immediately ahead of him and behind the winning three, the brilliance of the winners would not stand out as it does. It is the performance of the last man, in fact, that offers the contrast which leads to our admiring the winner—just as the amazing stupidity of Doctor Watson enhances by contrast the astuteness of Sherlock Holmes.

One of the charitable purposes of this department is to dig up from the obscurity of last place the gentlemen who have fought for and won it, and to present them, in all their lack of speed, to the six dissatisfied perusers of this space. With which kindly though possibly ill-advised purpose, we now haul out of oblivion the commanding bulk of one Roscoe Turner, Lieutenant Colonel, Nevada National Guard, complete with blue uniform, meat-eating chipmunk, press agent, hand-colored photographs, and an appointment on the staff of the Governor of Nevada. The last place from which we tow this old slow-coach is the position of end man in the non-stop race from Los Angeles to Chicago, during the National Monocoupe Races.

The funny thing about Roscoe, however, is that while he was last in the race, he was first in the news. He got more inches of publicity than any of the winners, largely because of the efforts of Charlie Haldeman and a lion named "Gilmore," after an oil company of the same moniker which sponsored the flight. Charlie got pictures of Roscoe and Gilmore—or Gilmore and Roscoe, I should say—in every position in which a lion cub and a man might expect never to find themselves. For instance, there were pictures of Gilmore signing a hotel register with a pen held in his teeth, while Roscoe watched him. Then there were snaps of Roscoe signing, himself, while Gilmore watched. Then Gilmore posed reading a newspaper, while Roscoe peered over his shoulder; after which Roscoe was seen reading the news while Gilmore looked on. All of which goes to show that Roscoe, starting as a mere pilot, at last has become an animal trainer—and also that as a publicity getter one small lion is worth at least three big airplanes, because there were lots of airplanes around the races, and only one lion. Which, I maintain, was just as well. One lion is plenty.

The first time I was stunned by the vision or sartorial magnificence the world has come to know as Roscoe Turner, was at the Dayton races, in 1924, I think, soon after he had got married, when he brought his bride and a Jenny to the races. Most of us in those days wore overalls—to cover up the patches in our pants—but the great Roscoe appeared as a super-production in robin's egg blue, with gold wings, whip-cord breeches, and military cap with wings and the initials R. T. splashed over it. He had no passes—and never has accepted or used a pass at any race—he simply said, "I am Roscoe Turner," and the minions on the gate let him in without question. If he had said, "I am the Maharajah of Baluchapore," or "the Sarawak of Singapatam," he would have got in with equal facility, for he looked the part. Little did we suspect then that he was fitting himself to become an animal trainer, though we should have known that he was bound to advance himself in the profession. His nerve alone was enough to procure admittance not only for himself, but for a whole company of infantry as well. Nobody but Roscoe could have worn that outfit and survived annhilation, and to this day none but the women pilots can compete with him in strangeness of adornment and get away with it.



Col. Roscoe Turner and Gilmore

Delving into the past of this Hagenbeck of the air, I find that he enlisted as an ambulance driver in the United States Army in May, 1917. Whether or not he wore the standard Army uniform I do not know, but I imagine he had his name or initials prominently displayed on it, or else he threw it away and had a tailored outfit made to his own design. In October, 1917, he transferred to the Air Service, and became a Second Lieutenant in March, 1918; and either got promoted or promoted himself to First Lieutenant in May, 1919. I think he made the Army do it, though, as he was Overseas from September, 1918, to July of the following year. He got the blue uniform idea from the French, and improved on it, but as they wouldn't let him wear it in the Air Service, he resigned and bought a Canuck, in which he toured the country advertising the Curlee Clothing Company of St. Louis.

He spent his honeymoon flying around advertising clothing, after which he returned to his home in Corinth, Miss., left the wife and Jenny there, and bought an OX Standard from Bill Robertson of St. Louis. In this high-powered contraption he toured the land again, taking executives of the Curlee company to Texas, a very fine state for flying. Down in those great open spaces, if the motor doesn't rev up enough to fly, you can taxi from place to place—a consideration when you use an OX-5.

After nibbling some loco weed in the cow country, Roscoe organized a flying circus with three planes, endured the usual fortunes of such outfits, and finally bought a Bréguet from that very fine pilot and admirable gentleman, the late Tony Yackey. In this plane he toured the country, impressing the yokels with his uniform—at which point it began to appear to the rest of us, in overalls, that Roscoe had more than the idea of mere personal adornment in mind when he designed that haberdashery. We flew in to a town looking like tramps—and were accepted on our face value. Roscoe arrived as a visiting general or admiral or Eastern Potentate, and was accepted as such. It was nothing extraordinary for him to have the Mayor and the Firemen's Band turn out to greet him. After which all the prominent people of the town clambered to fly with someone who might be the Gaekwar of Baroda, for all they knew to the contrary.

Thus impressing the yokelry of the hinterland, the great Roscoe waxed exceeding prosperous and bought the Sikorsky S-29, which he piloted through eleven states for R. H. Macy and Company of New York and later flew around as an aerial cigar store for United Cigar Stores. By this time Hollywood got word of him, and induced him to fly in Hell's Angels, in which

(Continued on next page)

(*PersonAIRlities continued*)

he spun and looped the Sikorsky.

Roscoe then organized the Nevada Airlines and operated it for eight months. It covered a thousand miles a day, never missed a run, and never had a forced landing—I think they used Wasp-motored Lockheeds. During this time, 1929, Roscoe made a record flight across the continent with four passengers. He is now flying for the Gilmore Oil Company and that lion, and owes all his success to his haberdasher and to his love for animals. He has even grown so famous that people steal his clothes for souvenirs. In Chicago they entered his room and took the famous blue coat, a Sam Browne belt, two silk shirts, an imported pair of breeches, some underwear, and a wrist watch. If the thief has a spark of patriotism, he will send that blue coat to the Smithsonian to add to the other precious relics of early aviation.

He's a good sportsman, is old Roscoe—almost as happy to arrive last as first. Keep your eye on that old boy—I think he's going to make some very good flights here and there, and he isn't going to be last, either. A pilot with nerve enough to wear that uniform and kick a half grown lion in the pants is bound to come in first eventually.

EDDIE SCHNEIDER, who holds the junior transcontinental record by virtue of flying from New York to Los Angeles and return in fifty-three hours elapsed flying time, was born October 20, 1911, in Red Bank, N. J., and received his education in the little red school house of that town. The Leonardo High School was the name of his last place of learning, and it is little and red, so I'm not merely speaking romantically. Incidentally, it is to be congratulated on turning out a very good lad, quiet, modest, and unassuming, with no swelled head as the result of publicity.

Eddie, at nineteen, has enough common sense to know that any competent young pilot with his hours—he has about 325 now—should be able to go from New York to Los Angeles and return without losing his way or cracking up; and therefore he regards his successful accomplishment of the flight as merely a normal advancement of his flying career, and nothing to make any great hurrah about. In this day of pilots, male as well as female, who spend long hours in happy contemplation of their own excellence, it is refreshing to chat with a lad who realizes that, despite all that has been printed about him, he is still just another young fellow in an airplane, trying to get along. I therefore commend him, not for the flight, which I naturally expected him to make successfully, but for the common sense he displayed when admiring reporters referred to him as a "young eagle" and a "young knight of the air," and other such rubbish, indicating solely diseased reportorial imaginations.

P. & A. Photo

Eddie Schneider, holder of the junior transcontinental flight record

Eddie—he was christened Eddie, not Edward—got into aviation through the back door, as it were. He worked first at Roosevelt Field as a currier down of the aerial steeds—in plain words, as a wiper of dust and dirt from the planes. Graduating from this useful though humble employment to the dignity of a mechanic, at which trade he worked nearly two years, Eddie started to take flying instruction, spending in all some thousand dollars, which he had made himself as wages. It took a lot more stamina to do that than it did to fly across a continent.

That's about all the biography Eddie has piled up to date. I print it here for the encouragement of about 10,000 or more young fellows who would like to travel as far as Eddie has traveled, and from an equally humble start. If they have the determination and the self-control and the common sense necessary, they can make the grade too. Recall that Heinz started life without a single pickle.

On his long flight, Eddie got caught blind over the Alleghany Mountains—which taught him to land the next time before the going gets too tough. He had no turn-and-bank indicator or rate-of-climb indicator; all he had was a compass. But he flew level and straight through the fog by watching the compass tilt; he just sat there keeping that compass level, and finally got into the clear.

On reading this over, Eddie, I feel a doubt that I may have laid it on a trifle thick, though you're a good lad and deserve some commendation for your hard work—not for anything else, understand. If I ever hear of you getting one of these "famous pilot" complexes I'll have to wander over there to Roosevelt and casually roll you in the dust. I'm big and tough enough to do it, too, you know that. But I figure you'll jog along your quiet way, unperturbed.

PILOT JOHNS of the Flying Grocery Store gives his considered opinion of Northern Michigan: "I found out that country was not taken away from the Indians—they moved out on their own accord. They got some high hills there. I saw some black specks on a hill and went down to investigate. They were crows, walking over the top."

EARLY BIRDS

VICTOR VERNON learned to fly at Hammondsport, New York, on a Curtiss flying boat, April 1914. He was instructed by the late Glenn H. Curtiss, Doc Wildman, E. Doherty and Lanny Callen. But he didn't go solo until he purchased his own boat—they were very cautious about first solos in those days. However, Vernon pulled it off all right, though it must have been a terrible strain, nervously and financially, doing his first solo in his own airplane He got the Aeronautical Society License No. 47 and engaged in exhibition work and passenger carrying with this boat at Buffalo and later in Maine during the summer and fall of 1914. That winter he operated from the Royal Palm Hotel, Miami and in the spring of 1915 joined the Curtiss company at Toronto and instructed the first Canadian pilots for the war.

He prepared a lot of Canadians to get shot in France—for $200 a month and sixpence a week to drink the King's health in—and then he went to Newport News for the Curtiss company. The supply of Canadians anxious to extinguish themselves for King and Country, still continued, so Victor instructed them how to go about it. Victor has probably baled as much cannon fodder as any of the early instructors. In addition he instructed the National Guard units and U. S. Navy aviators on Dep control, and acted as test pilot for the Curtiss company with Victor Carlstrom, Stephen MacGordon, Bert Acosta and Walter Lees, who is now with Packard.

In the fall of 1916 Vernon was appointed Chief Instructor for the U. S. Army, and got his first close look at a general, which may have been the reason he decided to join the Navy later on, never having seen an admiral. But meanwhile, with Captains Morrow and Christy, he formed the first instruction unit in Chicago, Ashburn Field, fall of 1916. He helped to open the fields and instructed at Rantoul Field, and Wilbur Wright, at Dayton, then was sent to Lake Charles, Louisiana, to form and operate an Instruction School, which he had charge of until May 1918. That was when he joined the Navy—May 10, 1918, and was commissioned a Lieutenant, Senior Grade, U.S.N.R.F. He was test pilot at Anacostia and at the Naval Aircraft Factory, Philadelphia, which latter job must have entailed a lot of suffering.

Vernon went on inactive duty in April 1919, and again joined Curtiss, this time in charge of flying operations. Then he formed the Oregon, Washington and Idaho Airplane Company of Portland, Oregon, which sunk under the weight of its own name in July 1922, a season that compared favorably with the historic October 1929 of blessed memory. From 1922 to 1929 Vernon engaged in the investment business, representing Halgarten and Company in

(*Continued on next page*)

(PersonAIRlities continued)

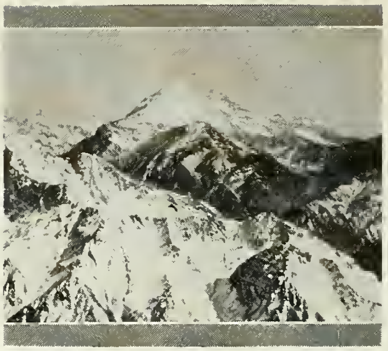
Syracuse until July 1929, when aviation called again, and he joined Curtiss-Wright Airports Corporation, New York. By the time this gets printed he'll probably be a member of the alumni association. Every large company has one, you know.

JUST to show you how a man can go up in life, from a real low starting point to a higher altitude than hardly any of us attain, take a look at the life history of Kirby L. Whitsett. The first trace I get of him is in Marshall, Missouri, back in 1896; and the last trace I have of him is in November, 1929, when he was flying a Ford over the Andes at an altitude of 18,500 feet above his starting point at Marshall, Missouri, thirty-four years before. It just goes to show how far a man can climb in thirty-four years with a good airplane.

Kirby Whitsett

And it took a good man to overcome the handicap of a start from Marshall, Missouri. The average man from Marshall figures that he's seen the world if he ever gets as far as Kansas City. And as for Kirksville, Missouri, only one man ever got away from there. That was Roy Dodson, and he only got as far as Boston, flying for Colonial. Only difference between Boston and Kirksville is that Boston is nearer Saugus. Culturally, Boston and Kirksville get the same rating. This is arranged by the Watch and Ward Society.

But we were speaking of Pilot Kirby Whitsett and South America, so to add a touch of local color we publish a photo of Mount Aconcagua. This was posed especially for AERO DIGEST, and is a very good likeness. Aconcagua, if it's of any interest to you, is 23,000 feet high and is the highest point in the Western Hemisphere, while the lowest point is the Senate lobby, in Washington. The planes of the New York, Rio and Buenos Aires Line pass it daily and think nothing of it. I don't think much of it myself, but merely shove it in here to add a touch of variety to the life of a reader in the flat lands of Illinois. People in Illinois simply crave mountains, or anything raised above the dreary level of life along the Chicago Drainage Canal. You can see hundreds of them gazing up at the Wrigley Building and crying softly to themselves.



Mount Aconcagua, 23,000 feet above the Senate lobbyists

Starting at scratch from Marshall, Missouri, the ambitious Whitsett became an Early Bird by going to work for Frank Champion, at Overland Park, Kansas, in 1915. He helped Champion build a Blériot monoplane and then went with him on exhibition work through the Middle West, after which, in January 1916, he became a member of the Thomas Winter School of Aviation at St. Augustine, Florida, which soon sunk out of sight. Whitsett, noticing to his amazement that men in the Army—unlike those in commercial aviation—actually ate three times a day, joined the Aviation Section of the Signal Corps in July 1916. His first signal was a distress signal to the cook. It was answered, and he felt so kindly to the Army that he even thought Top Sergeants were all right. That is, he thought so until his hunger wore off, and then they looked the same to him as they did to the rest of us.

Meanwhile the Army sent him to Ithaca, New York, to receive from the Thomas School there the instruction he had paid for in the defunct Winter School. He only got about three hours when *that* school closed for the winter. You see the tough start Whitsett had—he'd no sooner get to a school than it would close. Flying schools in those days were like clams—at the slightest touch they'd close up, with the student's tuition money firmly clamped in their jaws.

Well, the budding airman was sent to Mineola and assigned to Tex Millman, who soloed him on November 28, 1916. He was the second enlisted man in the U. S. Army to receive flying instruction, and should have been a general by this time. But during the war he was an instructor and test pilot, and got overlooked, although he was probably going through more dangers than any pilots at the front. There should be, if not promotions, at least decorations for those early test pilots. But all they ever got decorated with were bruises. You take the fellow who tested the first Liberty DH's—he should rate the Congressional Medal. And the man who took the first Martin MO-1 rates a Victoria Cross, with palms and a couple of banana skins. If one of the early airplane designers ever writes a book on his life work, I suggest he entitle it "Test Pilots I Have Terrified."

During the war Whitsett flew at Essington, Pennsylvania; Lake Charles, Louisiana; Park Place and Ellington Fields, Houston, Texas. He flew for a few years after the war, then quit, returning to aviation in 1928. He went on with the Robertson Lines from St. Louis to Chicago, and then helped open Colonial Air Transport from New York to Boston, with Fords, later transferring to N.Y.R.B.A.

P. & A. Photo.

A group of Early Birds before an early Curtiss exhibition type pusher at the National Air Races, Chicago

MR. H. H. WETZEL,
Vice-President, Douglas Aircraft Company, Inc., Santa Monica, California, builders of planes for the United States government.

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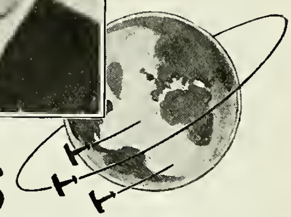
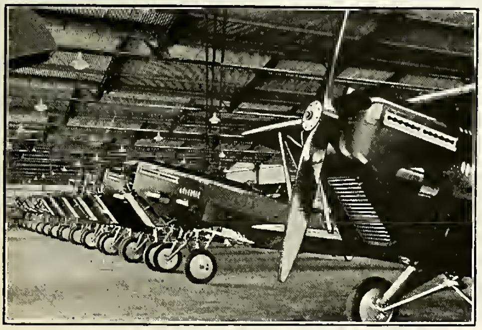
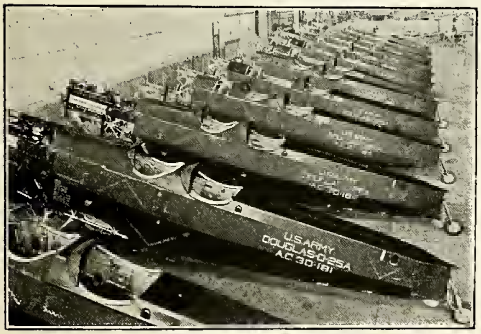




Airplanes in production for U. S. Army



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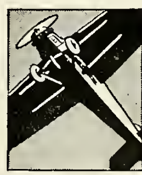

LOS ANGELES COUNTY

Flying All-Year

TECHNICAL

Digest of Foreign Technical Articles Relating to Aeronautics

By Elsa Gardner

AIRPLANE COMPARISON

Comparison of Aircraft, P. H. Sumner, "Flight," No. 22, No. 30, July 25, 1930, ("Aircraft Engineer" Supplement), pp. 49-52, 8 tables.

SIMPLE ratio values permitting a rapid comparison of the flight and load characteristics of aircraft (which have been suggested by Major Guglielmetti and A. Tripodi of the Italian Air Service) are applied over a large range of fairly modern aircraft. The planes are classified according to the military purpose for which they are designed and their speed, climb, and useful load ratio determined. One table is devoted to a comparison of flying boats, the winners of this class being the French Latham H.B. for speed ratio, the German Do.X. for useful load, and the French C.A.M.S.51 for climb ratio.

Of the single-seater fighter class, according to the author's computation, the French Nieuport 29 is allotted first place in speed, useful load and climb. The low horsepower is responsible for the higher efficiency ratios. In the multi-seater reconnaissance class, there is not a great difference in speed ratios, the French Potez 25-A2 being first. This plane's speed is slow at 203 kilometers per hour, but not as slow as the Breguet 19-A2 with the same horsepower. In this class the U. S. Martin leads in useful load and the Czechoslovakian A11 HS in climb. Of the single-engined day bombers, the Czechoslovaian Smolik 6 occupies first place in speed, useful load, and climb ratios due to a very low power of 260 horsepower. With the multi-engined bomber types, speed and climb is easily first for the Italian Caproni 73bis, both in the economy ratios and actual performance, the first in useful load being the British Hinaidi.

HELICOPTERS

Theory of the Helicopter Propeller. Research on the Necessary Conditions for Obtaining the Maximum Braking Force (Teoria dell'elica in autorotazione, ricerca delle condizioni necessarie per ottenere il massimo effetto frenante), G. Serragli. "Notiziario Tecnica Di Aeronautica," Vol. 6, No. 7, July 1930, pp. 40-53, 4 figs.

THIS study is limited to the use of the propeller of a helicopter or autogiro for descent, and after vertical fall is considered, oblique translation at large incidence is taken up, which is an interesting case of the use of the propeller as a brake in retarding the fall of the apparatus.

The author examines briefly the stability functioning and shows how it may be calculated from a given value of advancement corresponding to the aerodynamic pitch. With some development of the theory of aerodynamics he determines the form of blades best suited for the case of axial advancement. He studies the possibilities of obtaining the thrust coefficient greater than one, by the effect of profile drag, and finally explains the possibilities of obtaining the thrust coefficient greater or equal to one by the plane's falling at the large incidence of 30 to 40 degrees.

AIRCRAFT INSTRUMENTS

The Design of Aircraft Instruments, C. J. Stewart. "Aircraft Engineering." Vol. 2, No. 17, July, 1930, pp. 173-176, 11 figs.

DESIGN methods necessary for the production of aircraft instruments to satisfy certain conditions encountered in airplanes are outlined. These conditions include robustness, accuracy in positions installed, freedom from acceleration effects, ability to withstand temperature extremes without failure in indication, small bulk and weight, low drag if exposed to the air stream, clearness of indication in light or darkness, steadiness and stability of indication, good damping, resistance to corrosion, and ease of installation. Features which are necessary to avoid that the attempt to satisfy one condition does not result in violating other conditions, are commented upon.

The author emphasizes the fact that adaptations of cognate designs used in other industries usually result in failure and expense.

AIRPLANE TESTING

The Calculation of Resistance and Static Tests (Calculs de resistance et essais statique) L. Kirste. "Aeronautique," Vol. 12, No. 134 ("Aerotechnique" supplement), July, 1930, pp. 253-264, 11 figs., 1 table.

THIS is a comparative study of the various national regulations governing the calculation of the resistance of the airplane structure and shows that their conditions are far from being identical. Methods are developed for calculating the external forces which act on the plane in flight or on the ground, and for calculating the internal stresses which result and give fatigue in the structure.

A comparative table shows the principal cases of calculation, the breaking stresses, and their distribution, imposed by the regulations of the Bureau Veritas, United States, England, Germany, and Italy, and covers the external forces in flight, the stresses due to a group of engines in more than their weight and forces due to the pilot at the controls.

Various types of equipment employed in testing the elasticity, static testing, and dynamic testing are described with special reference to that employed by the Blériot company, of which the author is an engineer.

AERODYNAMICS

Wind Tunnel Experiments on the Burnelli Principle. A. Klemin. "Flight," Vol. 22, No. 35 ("Aircraft Engineer" supplement), August 29, 1930, pp. 57-60, 9 figs., 2 tables.

THE author describes the results of model tests made in the New York University wind tunnel on wing and body combinations of the Burnelli airplane in which the fuselage is of unusual shape, being of airfoil section. This combination shows, on the whole, favorable aerodynamic features.

In spite of the wide fuselage, the maximum lift coefficient was only slightly affected. There are no data available which are directly comparable for L/D values, but although the maximum L/D of the entire combination is somewhat reduced from that of the main wing, it is probably not as large a reduction as for an airplane of conventional design having a fuselage and two engine nacelles. The stability is not more affected by the airfoil type fuselage than by a conventional type of fuselage. The maximum L/D of the entire machine is exceptionally high for a model tested under the present L/V conditions.

SUPERCHARGERS

Supercharged Aviation Engines (Motori D'Aviazione Suralimentati), C. A. Italo Raffaelli. "Rivista Aeronautica," Vol. 6, No. 7, July, 1930, pp. 1-20, 19 figs.

VARIOUS existing types of superchargers for airplane engines are examined, including the Roots, Cozette, Zoller and Powerplus volumetric superchargers, and the Rateau, Lorenz, Junkers, General Electric and Brown centrifugal superchargers. Their difficulties and advantages are commented upon, and the results of their applications to the Liberty, Liberty inverted, Pratt and Whitney Wasp, Rolls Royce R, Farman 500-horsepower, Junkers L55 high-speed, Wright Whirlwind and Cyclone, Armstrong Lynx and Jaguar, and the Curtiss Conqueror engines are outlined. The author concludes that supercharging may be adopted only for engines constructed for very high rates and when furnished with a propeller having a pitch variable in flight.

PROPERTIES OF LIGHT ALLOYS

Mechanical Properties of Pure Magnesium and Certain Magnesium Alloys in the Wrought Condition, S. L. Archbutt, F.I.C., and J. W. Jenkins. Presented by W. Rosenhain. Aeronautical Research Committee Reports and Memoranda, No. 1287 (M 67), February, 1929.

THIS report is a continuation of R. & M. Reports Nos. 1037 and 1285, February, 1928, and relates to further tests on wrought magnesium and six per cent aluminum alloy, and to the production and properties of two copper alloys, namely, three per cent copper and 13 per cent copper in magnesium (one form of Elektron).

A summary table of typical average re-

(*Continued on following page*)

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(Continued from preceding page)
sults from all three reports is included to facilitate comparison of properties of the four metals investigated. It is proved that six per cent aluminum alloy possesses the best all-around mechanical properties and, by controling working conditions, relatively good tensile and fatigue properties may be obtained and the specific tenacity is high. Three per cent copper alloy is inferior in almost every test.

The strength of all three materials prepared at the laboratory was very sensitive to rolling conditions and fell off rapidly with temperature rise after a few hours at the testing temperature. The general effect of annealing by exposure to 350 degrees for five hours is a decrease in maximum stress and elongation. Prolonged exposure beyond five hours up to 100 hours to the high temperature of 350 degrees centigrade has little further effect on the mechanical properties of the pure metal or three per cent copper alloy, but with six per cent aluminum alloy some further decrease in maximum stress and elongation is observed which is accompanied by a marked increase in energy absorbed on impact. Thirteen per cent copper alloy presents many difficulties in rolling.

AUTOMATIC AIRPLANE CONTROL

The Automatic Stabilization by Means of the Constatin Wind Vane (La stabilisation automatique au moyen des girouettes Constantin), P. Leglise, M. Constantin, Verdurand, and Vo'merange. "Aeronautique," Vol. 12, No. 135 ("Aerotechnique" supplement), August, 1930, pp. 297-300, 4 figs.

In the first section of the article, Mr. Leglise describes the construction and operation of this type of automatic airplane control, and its performance in the Farman F-71 biplane. This part is followed by comments of the inventor and two observers.

The device consists of a horizontal wind vane which controls the stabilization of the angle of incidence of the wings, and the vertical wind vane which actuates the ailerons under influence of the variations of the lateral component relative to the wind. The horizontal wind vane consists of two supported surfaces mounted on a quadrilateral joint and held in equilibrium statically and dynamically by two counterweights, following all the variations of the wind. By means of a release the pilot may change the control of the elevators by the joystick to automatic elevator control. The setting of the average angle of the vertical wind vane is regulated on the ground and cannot be displaced in flight as can the horizontal vane. It was found that a plane operating under this automatic control banked at an inclination more comfortable for the passenger than in the pilot-controlled plane.

AIRCRAFT FUELS

Gas Fuels for Airships, P. I. Teed. "Engineering," Vol. 130, No. 3368, August 1, 1930, pp. 148-149.

ADVANTAGES of gas fuel for aircraft, such as the "Blaugas" employed on the *Graf Zeppelin*, are discussed and a comparison made in which the R-100 British airship is considered as flying 3,000 air miles at full speed, equipped with each fuel system in turn.

The author shows that the gas-fuel system permits of 124,024 cubic feet of hydrogen having a lift of 3.8 tons and being used for carrying load additional to what would be possible with the gasoline-propelled ship. However, for emergency an additional 2.7 tons of gas fuel would have to be available, thus leaving the initial gain in load-carrying capacity as 1.1 tons. Thus a small practical increase is gained at the cost of slight decrease in horizontal speed. The author believes that gas fuel is slightly superior to gasoline also because danger from fire is reduced, but he thinks that if reliable Diesel engines weighing about four pounds per horsepower become available, the vogue of fuel gas will be of short duration.

AIRPLANE PERFORMANCE CALCULATIONS

Some Generalized Curves for the Accelerated Motion of an Airplane, H. Glauert. Aeronautical Research Committee Reports and Memoranda, No. 1291 (Ae 440).

THESE curves are given as an aid in solving the problems which frequently arise, involving the rate of acceleration of a plane in a steep dive, rapidity with which a plane can pass from horizontal flight to a dive, and the rate of acceleration or deceleration in horizontal flight.

Approximate calculations have been made on the assumption that the rate of revolution of the engine and airscrew is maintained constant during maneuvers, and results are given in the form of generalized curves which can be used for any plane. Results depend on two constants only of the airplane; namely, its top speed of horizontal flight and the corresponding drag-lift ratio. All speeds are given as multiples of this fundamental speed expressed in feet per second, and all distances as multiples of the fundamental length of velocity squared, divided by gravity.

AIRPLANE STABILITY

Lateral Stability Calculations for a Bristol Fighter Airplane, A. S. Halliday. Aeronautical Research Committee Reports and Memoranda, No. 1306 (Ae 446).

FROM usual equations of motions the subsequent lateral movements of an airplane (the Bristol Fighter), following the initial disturbances or sudden application of either ailerons or rudder, are developed.

The calculations are based on the theory of stability given in "Applied Aerodynamics," by L. Bairstow. Gliding flight only has been considered, thereby eliminating uncertainties due to slipstream effects, and the axes of reference are chord axes, these being treated as principal axes.

Calculations are made for the plane in gliding flight for a range of angle of incidence from zero degrees to 24 degrees by intervals of four degrees. The control calculations assume a rudder angle of 20 degrees and an aileron angle of 10 degrees. For each of the various disturbances the resulting motion of the machine has been plotted for a period of time of five seconds.

The plane is found stable throughout the range of incidence, except for angles of incidence of 16 and 24 degrees, and also at 20 degrees. When the continuous rotation value is used in place of the one derived from the oscillation method, the machine is then very unstable at this angle.

AIRCRAFT SOUND LOCATOR

Acoustical Properties of Some Sound Collectors for Aircraft Sound Locators, J. Obata and Y. Yosida. Tokio Imperial University—Aeronautical Research Institute—Report No. 62, Vol. 5, No. 9, July, 1930.

IN Report No. 59 (previously abstracted in AERO DIGEST) results were given of an investigation of the nature of sounds emitted by aircraft. Inasmuch as these sounds were found to be of extraordinarily complex nature, experiments were made to study the acoustical properties of some sound collectors for an aircraft sound locator, the results being embodied in the present report.

The acoustical properties of two parabolic reflectors and exponential horns were investigated. The directive property and magnifying power for sounds of various wavelengths were determined by aid of microphone and amplifier, and for the parabolic reflectors the distribution of sound intensity along the axis was also measured.

It was determined that the parabolic reflector has excellent directive property, although the magnifying power is not large. On the other hand, the single horn was found to be almost non-directive for sounds of the lower frequencies, so that whichever method, aural or electrical reception, may be used in the time difference or phase difference, two horns should be utilized for an aircraft sound locator.

AERONAUTICAL RESEARCH

The National Physical Laboratory. "Engineering," Vol. 130, Nos. 3369 and 3370, August 8 and 15, 1930, pp. 168-169 and 208-210, 4 figs.

EQUIPMENT employed in the aerodynamics department of the British National Physical Laboratory are described, with the results of recent research conducted there. Among these are included the design of the compressed-air tunnel which was adapted to settle certain scale effects problems, and improvements to the open-jet tunnel.

New developments in fluid motion, boundary layer, and skin friction, are outlined. As a result of the examination of the drag coefficients of flat plates towed edgewise through water, which showed considerable discrepancies in values obtained by different experimenters, it is assumed that flow in the boundary layer is partly laminar and partly turbulent for low ranges of the number, but becomes completely turbulent at high Reynolds numbers. Experiments in air seemed to prove this assumption correct.

General interference research, slotted wings, spinning, airscrew flutter noise measurements, drag of radial engines, and the continued researches of R. A. Frazer and W. J. Duncan on flutter and influence of mobility of fuselage upon wing flutter are taken up.

The installment in the August 15 issue of the magazine is devoted to details of the William Froude national tank, a comparison of the resistance of streamline forms in air and water, and the results of metallurgical and metallurgical-chemical research, surface tension, refractories, and optical pyrometers. Other forms of research undertaken by the Laboratory are described in the issues preceding and following these.

THE LAIRD SPEEDWING "Solution"

Thompson Trophy Race Winner at 201.96 m. p. h.

By

E. M. LAIRD

Laird Speedwing "Solution" powered with Pratt & Whitney Wasp Junior engine

THREE weeks before the opening of the National Air Races in Chicago, Lee Shoenhair, head of the aviation department of the B. F. Goodrich Rubber Company, placed an order with the E. M. Laird Airplane Company for a special Speedwing plane, to be powered with a Pratt and Whitney Wasp Junior engine, for entry in the Thompson Trophy Race.

Although handicapped by this short period of time in which to build a plane to compete against the nation's fastest, the entire personnel of the E. M. Laird company worked day and night to complete what proved to be the nation's fastest commercial airplane. The last few days and nights previous to the start of the race were continuous sessions without any rest periods.

The finished plane, designated as Model LC-DW 300, was wheeled from the final assembly floor of the factory at 3:30 in the afternoon of September first, the day the great speed classic was scheduled to take place. At Ashburn Field near the factory the engine was started, warmed up and checked for revs, etc. Charles W. (Speed) Holman, who was in the pilot's cockpit, nodded his head to pull away the wheel chocks, taxied down the field to the runway, and in a few minutes was in the air for the initial test flight of the new Speedwing.

After ten minutes of flying, he landed the ship and taxied to the line. "It's fast!" was his comment to the tired but anxious men who had spent the many sleepless hours toiling to complete the ship in time for the great race. He hurriedly gave instructions to the mechanics for minor adjustments here and there, and then ordered the gas tanks filled.

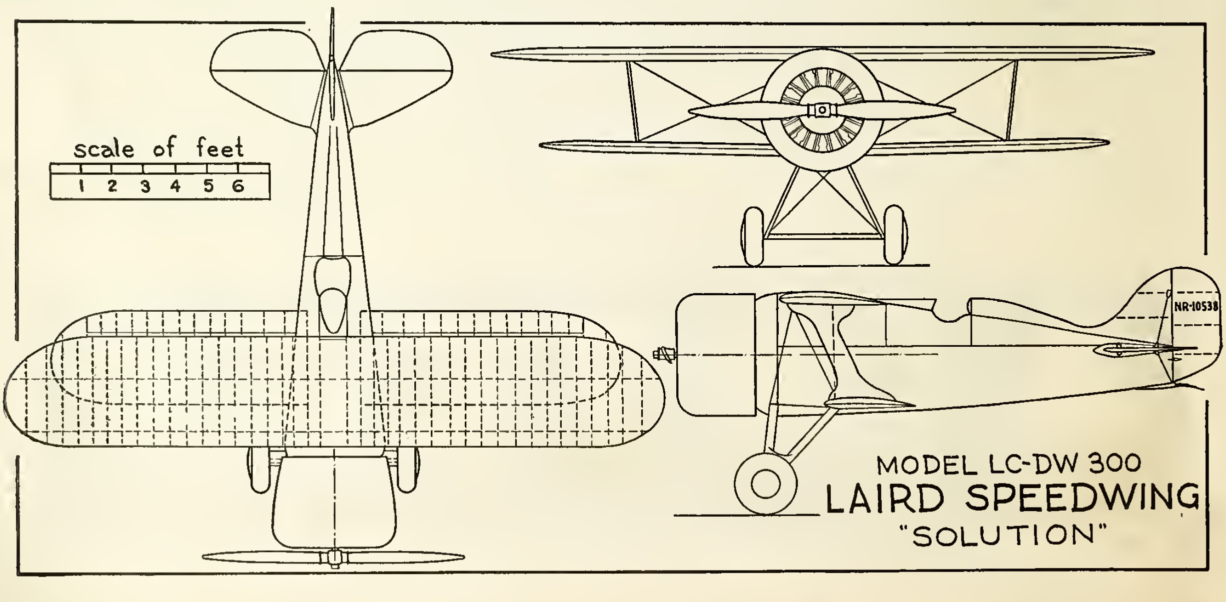
In the meantime, Lee Shoenhair, who expected to fly the ship in the race, had been prevailed upon by some of his friends to allow Speed Holman to fly it instead. Speed had been around the course in his own ship in two other races earlier in the week, whereas Lee had not been over the course at all and had little if any time left in which to familiarize himself with the flying characteristics of the new ship. Beside this, Speed has flown Laird ships for several years and has handled Laird speed planes in many previous racing events. After much persuasion, Lee agreed to let Speed fly the race. Speed immediately climbed into the cockpit and flew the ship from the Laird factory field to Curtiss-Reynolds Airport, arriving just in time to take his position with the other contestants who were already on the starting line.

Within thirty minutes after his arrival at the airport he was off in the race in which he piloted the Speedwing to victory, averaging 201.91 miles per hour for the 100-mile stretch (20 laps of a five-mile course), winning the Thompson Trophy and establishing a new closed course record for commercial ships.

The engine is fitted with a blower having a ratio of ten to one.

Complete technical data on the ship is not available at this time but the following list of specifications gives a general idea of its dimensions and characteristics:

Span, upper wing....................21 feet
Span, lower wing....................18 feet
Chord, upper wing...............42 inches
Chord, lower wing...............36 inches
Total wing area............112 square feet
Overall length.............19 feet 6 inches
Overall height..............6 feet 6 inches
Wheel tread................4 feet 5 inches
Propeller diameter..........8 feet 5 inches
Weight empty................1,380 pounds
Gross weight..................1,895 pounds
Fuel capacity......................50 gallons
Oil capacity.........................7 gallons
Engine, (Pratt & Whitney Wasp Junior) 300 horsepower
Wing loading...16.9 pounds per square foot
Power loading......4.21 pounds horsepower



OBSERVATION AND BOMBING AIRPLANES OF FRANCE—PART 2

Paul E. Lamarche

CONTINUING our descriptions of French observation and bombing airplanes from the September issue—the Les Mureaux 130-A2 on which comment was made in the previous installment, is powered by a 500-horsepower Hispano-Suiza engine, although other motors of equivalent power may be used. The armament is the same as on other types of reconnaissance planes.

Specifications

Hispano-Suiza 500-horsepower Engine

Span	49.21 feet
Length	27.88 feet
Height	10.17 feet
Chord	7.54 feet
Wing area	349.7 square feet
Weight empty	2,926 pounds
Weight of fuel	573 pounds
Disposable load	1,549 pounds
Gross weight	4,476.15 pounds
Wing loading	12.8 lbs. per sq. ft.
Power loading	8.82 lbs. per h.p.
High speed (sea level)	143 miles per hour
Speed at 3,280 feet	141 miles per hour
Speed at 9,840 feet	140 miles per hour
Speed at 16,400 feet	137 miles per hour
Climb to 3,281 feet	2 minutes
Climb to 9,843 feet	8 minutes 30 seconds
Climb to 16,400 feet	17 minutes 45 seconds
Altitude reached in tests	22,300 feet
Theoretical ceiling	25,590 feet

WIBAULT

Wibault 121-A2

Avions Michel Wibault of Paris, which specializes in the construction of all-metal military aircraft, has built a number of successful monoplanes for reconnaissance work. As stated in my article on French pursuit ships, this firm has built planes for a number of foreign governments, some of which have acquired the license for the construction of these types. Principal among the Wibault reconnaissance planes are the 121-A2, the 123-A2, the 124-A2 and the 125-A2. Two new types introduced this year are undergoing tests before the Technical service at Villacoublay. These are the 260-A2, a two-seater reconnaissance monoplane, and the 220-RN3 (*reconnaissance de nuit*), a three-place night reconnaissance plane.

The Wibault 121-A2, which is also known as the "Sirocco," is a two-seater monoplane for reconnaissance and combat. It has a braced parasol wing which is built up in two sections joined over the fuselage and supported there by N-struts. The wing is braced externally by a pair of oblique struts on each side reaching to the lower fuselage longerons. The thick wing has a rectangular form with square ends and is constructed entirely of duralumin. The ailerons extend over all of the trailing edge of the wing. The fuselage is rectangular in section and built entirely of duralumin.

The empennage is of the monoplane type with unbalanced surfaces. The landing gear is of the divided axle type built up in two units in inverted pyramid form. Besides radio and photographic apparatus for reconnaissance work, this plane carries an armament of six guns, with two fixed guns firing through the propeller, two mounted on the wing outside of the arc described by the propeller and two mounted on a ring over the observer's cockpit.

The plane is powered by the type 12 HB Hispano-Suiza engine which develops 580 horsepower. The Wibault 122-A2 is the same type of plane with an English Napier Lion engine.

Specifications

Hispano-Suiza 500-horsepower Engine

Span	41.5 feet
Length	30.9 feet
Height	10.33 feet
Chord	7.94 feet
Wing area	318 square feet
Weight empty	2,678 pounds
Total weight	4,525 pounds
Power loading	7.7 lbs. per h.p.
Wing loading	14.2 lbs. per sq. ft.
High speed	150 miles per hour
Minimum speed	57 miles per hour
Climb to 3,281 feet	3 minutes 7 seconds
Climb to 9,843 feet	9 minutes 29 seconds
Climb to 16,400 feet	20 minutes 22 seconds
Climb to 19,700 feet	32 minutes 30 seconds
Service ceiling	16,400 feet
Endurance at service ceiling	3 hours 30 min.
Theoretical ceiling	22,190 feet
Take-off run	498 feet
Landing run	624 feet

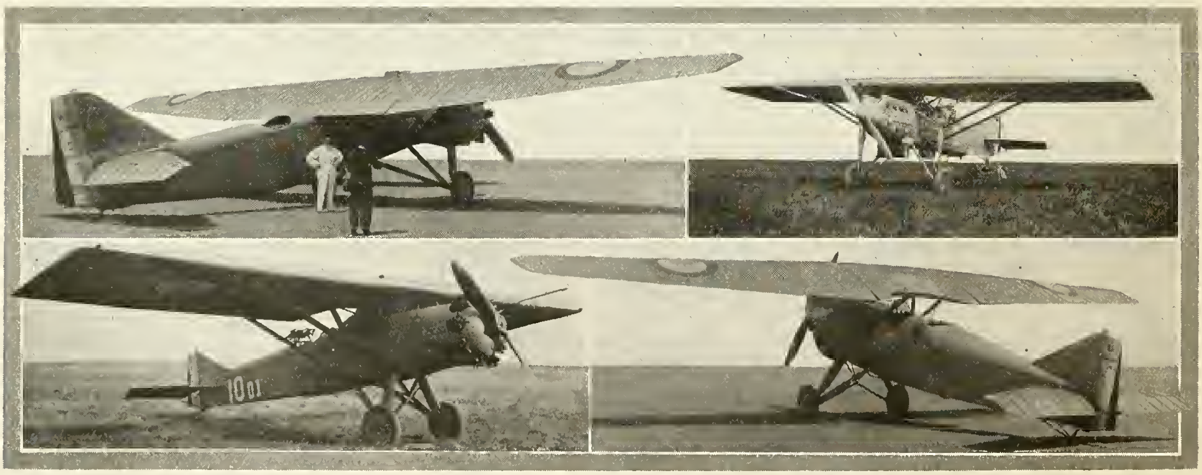
Wibault 123-A2

The Wibault 123-A2, which is also known as the "Tramontane" type, is a long-range reconnaissance monoplane powered by the Gnôme-Rhone Jupiter 420-horsepower engine. Its wing structure resembles that of the 121-A2, being a braced parasol wing of thick section built up in two parts that are joined over the fuselage. Its armament consists of two machine guns firing through the propeller and two Lewis guns mounted on a Scarff ring over the observer's cockpit. Full equipment, including wireless and photographic apparatus for reconnaissance, is carried.

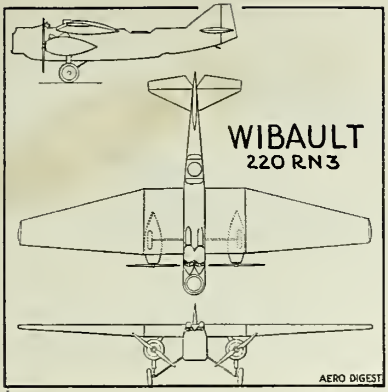
Specifications

Gnôme-Rhone Jupiter 420-horsepower Engine

Span	41.4 feet
Length	34 feet
Height	10.3 feet
Chord	7.94 feet
Wing area	318 square feet



Four types of Wibault reconnaissance planes: Upper left, 220-RN3 with two Gnôme-Rhone-Jupiter engines; right, 124-A2 with Hispano-Suiza engine; lower left, 123-A2 with Jupiter engine; right, 260-A2 with Hispano-Suiza engine



Power loading.............8.15 lbs. per h.p.
Wing loading............13.1 lbs. per sq. ft.
Weight empty................2,260 pounds
Total weight ....4,150 pounds
Range..........................373 miles
Speed at 13,125 feet......132 miles per hour
Speed at 19,700 feet......122 miles per hour
Climb to 3,281 feet....3 minutes 31 seconds
Climb to 9,843 feet....10 minutes 43 seconds
Climb to 16,400 feet....22 minutes 8 seconds
Climb to 19,700 feet..31 minutes 55 seconds
Maximum altitude reached on tests 22,100 feet
Theoretical ceiling...............25,200 feet
Take-off run......................394 feet
Landing run......................606 feet

WIBAULT 124-A2 AND 125-A2

The Wibault types 124-A2 and 125-A2 are of similar design but are powered with different engines, the 124-A2 having a 500-horsepower Hispano-Suiza and the 125-A2 a Renault 550-horsepower motor. Both planes are of recent construction and have been presented for trials at Villacoublay. They incorporate the characteristic Wibault metal construction and have braced parasol wings of thick section built entirely of duralumin. A number of modifications of the older types have been designed in these two new observation planes. An interesting change in these two monoplanes is in landing gear which has been adopted and which is often referred to in France as the *train d'atterissage à la Lindbergh* (divided axle type of landing gear) the two units of which are made up of V legs and a vertical strut which is attached to the forward wing spar.

Specifications

Hispano-Suiza 500-Horsepower Engine

Span..............................41.5 feet
Length.......................... 34.8 feet
Wing area................318.2 square feet
Weight empty................3,080 pounds
Disposable load...............1,630 pounds
Total weight.................4,710 pounds
High speed............140 miles per hour
Minimum speed ....60 miles per hour
Ceiling.........................21,380 feet

WIBAULT 260-A2 AND 220-RN3

The 260-A2 and the 220-RN3 have only recently been constructed, having been introduced at the meeting at Vincennes in June, and have been undergoing tests at Villacoublay. Not much information is at present available concerning these two planes. The fuselage of the 260-A2 is similar to that of the 125-A2, but the cantilever wing is of new design which is the plane's most interesting feature. Since there are no external wing bracing struts, this new plane has very clean lines with its neatly streamlined fuselage and well cowled Hispano-Suiza engine.

The 220-RN3 is a three-seater night reconnaissance plane of all-metal construction and powered by two Gnôme-Rhone Jupiter engines. The thick cantilever wing is secured to the top of the fuselage and tapers in plan and thickness towards the extremities. It has a total lifting surface of 559.5 square feet and a span of 61.68 feet. The two engines are suspended below the wing in nacelles, one on either side of the fuselage. The fuselage contains a machine gunner's cockpit forward in the nose of the plane, pilot's cockpit built into the leading edge of the thick wing and a third cockpit behind the trailing edge of the wing which is occupied by the observer. Equipment for night flying and reconnaissance work is carried. The landing gear, of the split axle type, consists of two V units extending from the lower fuselage longerons and a vertical arm attached to the engine mount.

Specifications

WIBAULT 220-R N 3

Span ....61.68 feet
Maximum chord.................11.48 feet
Minimum chord ....5.24 feet
Area of wing............559.5 square feet
Length ....39.37 feet
Height ....14.43 feet
Weight empty.................6,055 pounds
Disposable loda...............1,552 pounds
Weight fully loaded...........7,607 pounds
Wing loading...........13.4 lbs. per sq. ft.
Power loading.............9.04 lbs. per h.p.
Fuel capacity....................194 gallons
Track of landing gear............15.74 feet

AMIOT

AMIOT 122-BN3

The Amiot 122-BN3 (*bombardement de nuit*) is a large three-place single-engine night bomber which was designed by M. Amiot, an engineer of the Société d'Emboutissage et de Constructions Mécaniques, having a plant located in Colombes in the Paris region. As mentioned in my article on pursuit planes in France, this company has recently been absorbed by the newly formed Société Générale Aeronautique.

The big Amiot night bomber is of metal construction with the exception of the fabric covering on the wings and fuselage. Its armament and ability to carry a heavy load of bombs over a long distance makes it an interesting type of single-engine night bomber.

It is a single-bay biplane with staggered wings of unequal span. The upper wing, which is supported over the fuselage by N-struts of metal tubing, is built up of duralumin box spars and ribs in a Warren truss. The long ailerons are carried on this wing only. The lower wing is built up of duralumin spars in rectangular girder form. The fuselage is quite deep, having two decks or floors. It is built entirely of duralumin and has a rectangular section.

The landing gear is of the cross-axle type with two lateral V's extending from the lower fuselage longerons. The empennage is of the normal monoplane type with balanced rudder and elevating planes. The stabilizer is adjustable in flight. The Amiot 122-BN3 is normally powered by a Lorraine Deitrich 650-horsepower water-cooled engine equipped with a turbo-compressor for altitude work, but other types of engines of equivalent power can be used. The engine mount is of steel tube. The powerplant is accessible in flight by means of a small door in the fire wall.

The pilot's cockpit is behind the trailing edge of the upper wing where there is a wide cutout; the gunner-observer's cockpit and that of the navigator-bomber are immediately behind. Dual control is usually installed in the two forward cockpits. The defensive armament of the Amiot consists of two fixed Vickers machine guns fired through the propeller by the pilot, two Lewis guns on a revolving mounting over the observer's cockpit, and two Lewis guns fired downward through the fuselage from the navigator's cockpit. The number of bombs carried is regulated according to the plane's mission, since this plane is capable of long-range night work as well as short-range work with heavier loadings. Most of the bombs are carried on internal racks, the bombs being released through a large trap in the floor, the length of which is 11.81 feet. In addition to the internal racks, there are five external racks—one under the nose, two under the fuselage and two more under the wings.

The Amiot can be used for three kinds of missions: long-range reconnaissance, night bombing at medium range, and long-range bombing. For reconnaissance the Amiot is fully equipped with radio and photographic apparatus, though no bomb load is carried. With 1,056 gallons of fuel,

Amiot 122-BN3 powered with a Lorraine Deitrich engine

this plane has a theoretical range of 3,230 miles for reconnaissance work. The Amiot can carry a maximum of 2,536 pounds of bombs and has a range of 310 miles and a ceiling of 8,045 feet. For long-distance work it can carry a bomb loading of 1,279 pounds and 845 gallons of fuel, and has a theoretical range of 2,585 miles, which allows an average penetration of 1,055 miles into enemy territory.

Specifications

Lorraine Deitrich 450-*horsepower Engine*

Span	63.5 feet
Length	42.6 feet
Height	17.48 feet
Chord of upper wing	9.84 feet
Chord of lower wing	8.2 feet
Total area	915 square feet
Weight empty	4,680 pounds
Gross weight loaded	8,600 pounds
Wing loading	8.55 lbs. per sq. ft.
Power loading	13.4 lbs. per h. p.
Normal range	620 miles
High speed	130 miles per hour
Speed at 6,560 feet	123 miles per hour
Speed at 13,125 feet	114 miles per hour
Take-off run	312 feet
Landing run	459 feet
Climb to 3,281 feet	3 minutes 10 seconds
Climb to 9,843 feet	11 minutes 57 seconds
Climb to 16,400 feet	29 minutes 50 seconds
Theoretical ceiling	22,967 feet

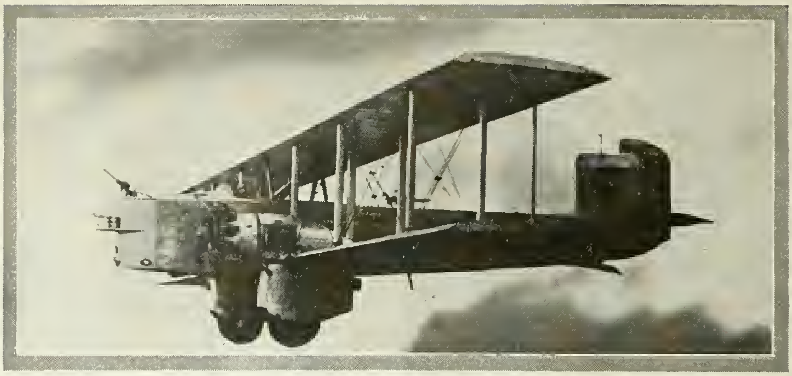
FARMAN

Farman F160-BN4

The Société des Avions H. & M. Farman is well known for its large night bombers of the Goliath type. Of the number of Goliath night bombers of different designations the F160-BN4 is the most modern and powerful. This big two-bay biplane is powered by two geared type 12 WE Farman 500-horsepower water-cooled engines and can carry a maximum bomb loading of 4,851 pounds.

This bomber, which is of wood construction, has wings of equal span which are rectangular in form with square ends. Both wings are built up in three sections, the upper wing having two outer sections and a center section carried over the fuselage by four vertical struts. The lower wing has two outer sections which are attached to a center section in the form of wing roots. The wings are of wood construction with a fabric covering and both upper and lower wings have ailerons.

The fuselage, rectangular in cross-section, is of wood construction with fabric covering. The empennage, like the wing, has wooden frames with fabric covering. The rudder is balanced.



A heavily armed Lioré et Olivier 20-BN3 night bomber in flight

The landing gear is in two units, each of which consists of streamlined legs supported under each engine. Each unit has a short axle which supports two wheels. The fuel tanks are carried in the fuselage.

The forward gunner occupies a cockpit that projects from the nose of the fuselage. The bomber-navigator's compartment is below and behind that of the gunner and is fitted with windows giving the bomber a good range of vision. This compartment is fully equipped with sights, bomb releases and navigating instruments. Aft of this but forward of the leading edge of the wings is the pilot's cockpit which can be arranged with two seats side by side or in tandem and with dual control. An internal bomb rack is installed behind this cockpit under the wing, after which is installed a radio sending and receiving set. The rear gunner occupies a cockpit aft of the trailing edge of the wings.

The defensive armament consists of two Lewis guns mounted on a ring over the forward gunner's cockpit, twin Lewis guns over the rear gunner's cockpit, and a fifth gun which fires downward through the fuselage from this aft cockpit. Lighter bombs are carried on the internal racks; medium-weight bombs are carried externally in groups forward and aft of the wings; heaviest bombs are carried under the central part of the fuselage. The F160-BN4 will accommodate seven medium-weight bombs up to 441 pounds as well as larger bombs above 882 pounds.

The electrical equipment on this plane provides current for the engine starters, lighting for night flights, heating and wireless. On the ground enough current is provided to allow the transmission of wireless messages for a period of twenty minutes.

Farman F160-BN4 powered with two Gnôme-Rhone Jupiter engines

Specifications

Two Farman 12 *WE* 500-*horsepower Engines*

Span	87.7 feet
Length	49.9 feet
Height	17.4 feet
Wing area	1,720 square feet
Weight empty	7,940 pounds
Weight of accessories	1,214 pounds
Weight of armament	241 pounds
Weight of crew	772 pounds
Fuel for 620-mile range	2,430 pounds
Bomb load	4,850 pounds
Total useful load	9,490 pounds
Gross weight loaded	17,400 pounds

Performance

With gross weight of 14,864 *pounds*

Speed (ground level)	116 miles per hour
Speed at 13,125 feet	109 miles per hour
Climb to 3,280 feet	4 minutes 42 seconds
Climb to 9,840 feet	17 minutes 28 seconds
Climb to 16,400 feet	45 minutes 47 seconds
Highest altitude attained	17,720 feet
Theoretical ceiling	18,000 feet

LIORE ET OLIVIER

Lioré et Olivier 20-BN3

The Lioré et Olivier 20-BN3, the outstanding French night bomber, has been adopted as a standard heavy night bombardment airplane in a number of countries. In 1926 this twin-motored ship was classed first in a competition for bombing planes organized by the French Minister of War, and it has since broken records in France for speed and endurance with a loading of 4,410 pounds. It is a biplane of all-metal construction with wings of equal span. Its simple construction makes it easy to assemble and repair, its elements being built up of a number of easily demountable and replaceable sections. It is powered by two 420-horsepower Gnôme-Rhone Jupiter air-cooled engines which are mounted on the lower wings.

The entire construction is of duralumin, fabric covered. The wings are built up in a Warren truss consisting of rectangular tube spars and ribs. The narrow chord ailerons are on both the upper and lower wings, and there are three sets of interplane struts on either side. The fuselage, rectangular in section, is built up of square dural tubing with plate fittings making a

simple assembly. The empennage, of the conventional monoplane type, is built up of frames of duralumin tubular spars and ribs of pressed duralumin sheet, and is fabric covered. The large fin is adjustable in flight so as to permit the pilot to trim ship should one engine fail. The stabilizer is also adjustable in flight, and the rudder is balanced.

The undercarriage has a wide track and consists of two units, one under each engine. Each unit consists of a duralumin frame box the extremities of which are attached to the front and rear wing spars with the large wheel supported inside and covered by a streamlined casing.

The fuel tanks have a capacity of 212 gallons which is sufficient to give the plane an endurance of five hours at cruising speed. They are protected against incendiary bullets and are carried in the fuselage. Dropping gear is provided. Oil is carried in rectangular tanks behind each motor, with a part of the surface of these tanks forming a part of the cowling of the engine nacelles for cooling purposes.

A wind-driven generator carried in the casing of one of the units of the landing gear furnishes the necessary electric current for lighting, wireless and heating.

The arrangement of the fuselage provides for a crew of three: a gunner-bomber who occupies a cockpit in the nose of the fuselage, a pilot whose cockpit is forward of the leading edge of the wings, and a rear gunner-radio operator who occupies the after cockpit. A communicating passageway connects all three posts. The defensive armament consists of two machine guns mounted over the gunner-bomber's turret in the nose of the plane, two machine guns mounted on a ring over the rear gunner's cockpit and a fifth gun firing downward through the fuselage from the latter post. The aft gunner's seat is provided with a lifting device which gives him quick access to the twin Lewis guns on top of the fuselage, the wireless apparatus inside and the single gun on the bottom.

The 20-BN3 has internal racks for ten bombs of medium weight, as well as external racks for seven bombs weighing between 220 pounds and 441 pounds, and one rack for a 1,103-pound "nest egg." The Lioré bomber can carry a loading of 2,205 pounds over a distance of 620 miles, or a bomb loading of 3,860 pounds with a range of 435 miles.

Specifications

Two Gnôme-Rhone Jupiter Engines

Span	72.9 feet
Length	45.1 feet
Height	14 feet
Wing area	1,130 square feet
Weight empty	5,690 pounds
Useful load	6,000 pounds
Gross weight	12,320 pounds
Power loading	13.9 lbs. per h.p.
Wing loading	10.3 lbs. per sq. ft.
Speed (ground level)	122 miles per hour
Speed at 3,280 feet	120 miles per hour
Speed at 9,840 feet	118 miles per hour
Speed at 16,400 feet	109 miles per hour
Climb to 3,281 feet	4 minutes 44 seconds
Climb to 9,840 feet	18 minutes 40 seconds
Climb to 14,780 feet	40 minutes 53 seconds
Theoretical ceiling	18,800 feet

BLERIOT

Blériot 127 Combat Plane

The Blériot 127, which might well be called the battle cruiser of the air, is one of the most interesting of large military aircraft built in France within recent years. As explained in the introduction to this article, this big twin-engined monoplane is designed to accompany and protect bombing and reconnaissance planes, its powerful armament making it a formidable foe in the air. A number of these multi-place combat planes have been constructed in the Blériot plant at Suresnes, near Paris, for the French air force. Built of wood, they are powered by two Hispano-Suiza 500-horsepower engines, one on either side of the fuselage.

The thick cantilever wing is of the midwing type. It is built up of two spruce box spars and ribs of spruce and plywood, with spruce runners uniting the whole structure. The wing has a fabric covering with a plywood reinforcement on the leading edge. The wings taper in thickness and chord. The ailerons, of large span, are fitted with trailing edge flaps which extend over most of their span.

There is a machine gun turret in the nose of the central fuselage. Two lateral nacelles attached to the under surface of the wing carry the engines in front and extend beyond the trailing edge of the wing where machine gunners' cockpits are located. Below and forward of the gunner's cockpit in the nose is the navigator's cockpit where equipment for bombing, photography, wireless and navigation are carried. This compartment is fitted with windows giving the navigator a wide range of vision. The pilots' cockpit, which contains two seats arranged side by side, is above the leading edge of the wing. Telephonic service keeps every man of the crew in touch with the others. The forward part of the central fuselage has a plywood covering, and the aft section, a fabric covering. In section view the fuselage is rectangular, being built up of spruce longerons. The empennage is of the normal monoplane type with unbalanced surfaces. Both the rudder and elevating planes are fitted with servo-flaps. Fuel is carried in droppable fuselage tanks, behind which are carried internal bomb racks. The landing gear consists of two separate units of V-struts under each engine which collectively support four wheels.

The armament consists of two Lewis guns mounted on a ring over the forward cockpit and two mounted over each of the rear turrets. These last two provide a firing range over a wide arc and give the gunners a wide sweep downward as well. Beside the offensive and defensive armaments of the three turrets, the Blériot 127 carries all of the necessary equipment for bombing and observation.

Specifications

Two Hispano-Suiza 500-horsepower Engines

Span	76.1 feet
Length	47.6 feet
Height	11.1 feet
Chord	15.1 feet
Wing area	946 square feet
Weight empty	7,170 pounds
Weight fully loaded	9,850 pounds
Wing loading	10.6 lbs. per sq. ft.
Power loading	9.9 lbs. per h.p.
Speed at 6,560 feet	137 miles per hour
Speed at 13,100 feet	134 miles per hour
Speed at 19,700 feet	128 miles per hour
Climb to 13,120 feet	12 minutes 21 seconds
Ceiling	26,600 feet
Greatest speed attained	143 miles per hour

Bleriot 127 combat plane powered with two 500 h.p. Hispano-Suiza engines

NEW WESTINGHOUSE PORTABLE POWER UNIT

A PORTABLE powerplant, weighing 120 pounds and capable of delivering 1,000 watts, has been developed by the Westinghouse Electric and Manufacturing Company. This plant is provided with duralumin skids which make it easy to transport. It is powered by a gasoline engine developing two horsepower at 4,000 revolutions per minute.

There is only one exposed moving part. All other parts are enclosed in a sealed bath of oil, protected from dust and dirt. The gasoline tank has a capacity of two and one-half quarts, sufficient to operate the engine for three hours under full load conditions. The engine speed is controlled by an automatic mechanical governor. Accurate speed adjustment is provided between 1,800 and 4,000 revolutions per minute.

This portable plant has been designed to meet the needs of construction and repair crews for a convenient and portable source of power. It is suitable for use in the field where power is required for drills, chisels, saws, and similar tools.

WACO CSO SEAPLANE

RECENT flight tests conducted at the plant of the Edo Aircraft Corporation at College Point, N. Y., resulted in the granting of Department of Commerce Approved Type Certificate to the Waco Model CSO equipped as a seaplane. The ship powered with the Wright J-6 engine of 240 horsepower is a typical three-place open land biplane converted to seaplane by the installation of Edo Model 2665 float gear. The gear consists of two standard Edo floats and of the attachment struts, wires and fittings designed specially for this ship.

The floats have a submerged displacement of 2,665 pounds each, and a total of 18 watertight compartments, any 10 of which are capable of supporting the weight of the ship. The floats are of metal construction throughout and are built upon a frame of extruded duralumin sections, fastened with heat-treated rivets and covered with non-corrosive Alclad metal. They are further protected against corrosion by a complete anodic oxidation treatment both inside and outside. Like all of the eleven standardized sizes of Edo floats, they are the single-step V-bottom, flat top type with the usual flutes or longitudinal steps on the forward portion of the bottom to facilitate easy take-off.

The system of attaching struts is made up of steel streamline struts and wires. All steel work is cadmium plated, and all struts are oil-coated inside and soldered air-tight after completion.

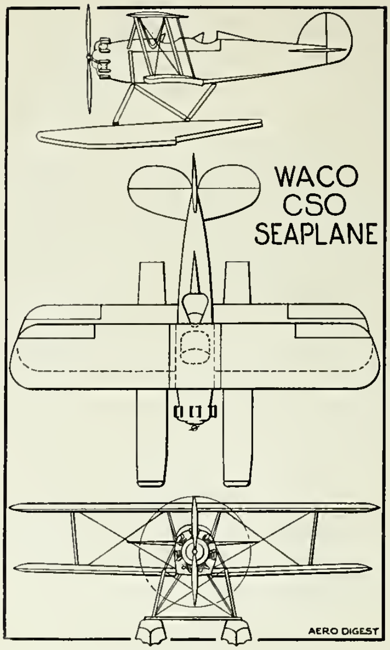
Some of the early deliveries of this ship included Dr. Alexander Forbes, dean of the Harvard Medical School and an enthusiastic sportsman pilot, as well as R. S. Fogg, who uses it as part of his equipment at Weirs, New Hampshire. A Waco BSO with J-6 Wright 165-horsepower engine (identical to the CSO, except for the powerplant) has also been licensed as a seaplane and is being used for barnstorming on the lakes of upper New York state.

Specifications

Span	30 feet 7 inches
Length overall	25 feet 10 inches
Height overall	10 feet 6 inches
Gasoline capacity	62 gallons

Weights and Performances

Weight empty	1,845 pounds
Disposable load	978 pounds
Gross weight	2,823 pounds
Rate of climb from sea level	About 1,000 feet per minute
Full load take-off	10 seconds



DISTRIBUTION OF WATER PRESSURE ON HULLS OF FLYING BOATS

THE investigation described in N.A.C.A. Report 346, by F. L. Thompson, was conducted by the National Advisory Committee for Aeronautics at the request of the Bureau of Aeronautics, Navy Department. This is the third in a series of investigations of the water pressures on seaplane floats and hulls, and completes the present program. It consisted of determining the water pressures and accelerations on a Curtiss H-16 flying boat during landing and taxying maneuvers in smooth and rough water.

The results show that the greatest water pressures occur near the keel at the main step, where the maximum pressure is approximately 15 pounds per square inch. From this point maximum pressures decrease in magnitude toward the bow and chine. Pressures of approximately 11 pounds per square inch were experienced at the keel slightly forward of the middle of the forebody when taking off in rough water. The area of the forebody subjected to considerable pressure is roughly a triangle having its base at the step and its apex on the keel at the load water line forward. On the bottom between steps, a maximum pressure of eight pounds per square inch is nearly uniform. A vertical acceleration of 4.7g is the greatest value encountered in landings, and is considerably greater than any other value recorded. It was found that 3g is approximately the maximum to be expected in take-offs in rough water, and that this value was exceeded during only a few landings. A longitudinal acceleration of 0.9g was once attained in a landing in rough water and 0.7g is not unusual for take-offs in rough water. The maximum lateral acceleration attained in cross-wind landings is approximately 0.5g. The results show that the landing loads were usually borne by an area near the main step, and that rough water may cause large loads to be applied near the middle of the forebody.

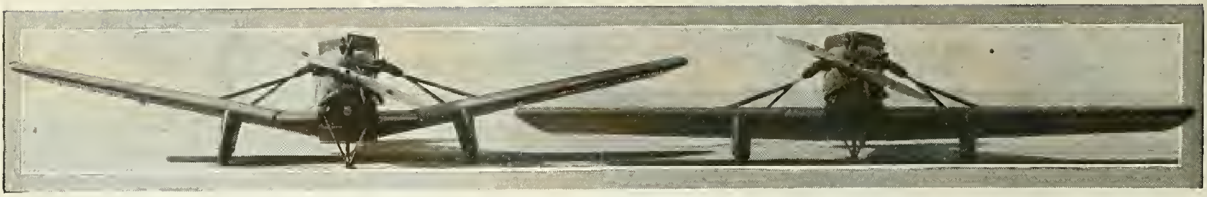
EFFECT OF TURBULENCE IN WIND TUNNELS

THE investigation described in N.A.C.A. Report 342, by H. L. Dryden and A. M. Kuethe, was carried out at the Bureau of Standards at the request of and with the financial assistance of the National Advisory Committee for Aeronautics. The paper gives some quantitative measurements of wind-tunnel turbulence and its effect on the air resistance of spheres and airship models, measurements made possible by the hot wire anemoneter and associated apparatus developed at the Bureau of Standards.

One important result of the present work is a curve by means of which measurements of the air resistance of spheres can be interpreted to give the turbulence quantitatively. Another is the definite proof that the discrepancies in the results on the N.P.L. standard airship models are mainly the result of differences in the turbulence of the wind tunnels in which the tests were made.

An attempt is made to interpret the observed results in terms of the boundary layer theory, and for this purpose a brief account is given of the physical bases of this theory and of conceptions that have been obtained by analogy with the laws of flow in pipes.

Views of the Waco CSO Seaplane at rest, taking off and alighting on the water



WATERMAN SAFETY PLANE

THE low-wing monoplane designed by Waldo Waterman was developed to meet the demand of the private individual wishing to fly his own plane and yet not caring to become an expert pilot. It is the designer's belief that he has developed a plane that the average individual who knows nothing of theoretical avaition can be taught to fly alone with reasonable safety in a very few hours of instruction.

The fundamental principles of the plane are applicable to all types of aircraft. The first plane developed is of the four-place cabin monoplane type. This size was decided upon because of the belief that, like the demands on the automobile industry, the four and five-place closed types will fill the predominating demand.

The wheels of the plane are rigidly attached to the wing with a wide tread. Instead of hinging the wing parallel to the fuselage it is hinged at an angle of approximately 25 degrees to the line of flight in the horizontal plane. The wing struts have air shock absorbing units built into their structure. The ship is provided with a Heywood starter operated by compressed air which also furnishes a source of compressed air supply required for varying the pressure in the two shock absorbing units.

Through the angular attachment of the wings to the fuselage the angle of attack and the corresponding resulting lift is decreased when the tips of the wings are raised.

The plane is likewise automatically stable in a fore and aft or longitudinal direction. The only thing that throws a ship off of longitudinal stability is more or less proportionate lift of the wings than that of the horizontal tail surfaces. An increase in lift which would ordinarily nose the plane upwards will flex both wings upward, decreasing its angle of attack or lift or immediately removing that force or lift which would nose the plane upwards. Likewise the converse is true in the case of a sudden decrease in lift of the wings which would ordinarily let the nose of the plane drop downwards.

All airplane design is a compromise. When the wings are attached to the fuselage at a relatively high angle of attack the characteristics of the plane are that it takes off quickly, lands slowly, and has a good rate of climb, but that its high speed and cruising speed are poor. In the Waterman plane, the wing is attached to the fuselage at a relatively high angle of attack when the tips are in a down position, which is the most efficient for take-off, climb and landing. When the plane has reached an altitude for cruising or high speed, air can be released from the air shock absorbing cylinders, allowing the tips to come upwards, giving the wing a low angle of attack for miximum efficiency for the high speed and cruising conditions. When the pilot is ready to land he turns a valve between the compressed air tank referred to and the air cylinders and increases the pressure in the air shock absorbing units, forcing the tips of the wings downwards and bringing the wing into a high angle of attack condition again for landing.

Because the shock absorbing units are in the wing truss, the ship is easy riding in rough air as the air shocks are dampened out.

In the Waterman plane, the wheels being attached to the wing, the wing is flexed upwards on landing. When flexed upwards the angle of attack is decreased over and above the amount that it is increased by the tail dropping. In this way the inherent characteristics of other planes which cause them to bounce if improperly landed have been eliminated. If a plane does not bounce when landing, the most serious thing that can happen to it is spinning around sideways in what is commonly known as a "ground loop," or hitting an obstruction on the edge of the airport. With the wide undercarriage incorporated in the Waterman design, a ground loop, even though a violent one, can cause little or no damage. In order to eliminate the danger of hitting obstructions after landing particularly while using very short fields or for the inexperienced pilots, the plane has been equipped with an arresting device as an accessory. A straight skid, approximately six feet long, is mounted below the fuselage just under the engine and pilot's cockpit parallel to the ground and a few inches above the ground when the wings are in a down position. After the plane is once on the ground after landing the air can be released from the air cylinders, permitting the wings and wheels to raise. This throws practically the entire weight of the plane on this central skid which causes it to come to a stop within thirty or forty feet. Upon stopping, the pilot can increase the air pressure in the air cylinders, raising the plane up from the skid and again taking the load on the wheels. The plane can then be taxied to whatever point on the field the pilot desires.

The ideas incorporated have been under development by Waterman for the last two and one-half years. The performance requirements set up in the fundamental design were those specified by the Guggenheim Contest, won a year ago by the Curtiss Tanager. It was not until last December, however, that Waterman felt that he had protected himself sufficiently by patents to make known his ideas. At that time a syndicate was formed for the purpose of financing the experimental work now under way. Ninety-six per cent of the capital was secured from pilots and executives of aircraft companies. Some of the best-known local aircraft people are interested financially in the Waterman Syndicate. Construction on the plane was started in the latter part of April of this year at the Los Angeles Metropolitan Airport where Mr. Waterman has been general manager since the Airport's inception. He has resigned his position with the Metropolitan in order that he may give his entire time to the further development of his new plane.

As a practical service test Mr. Waterman has flown the ship from the Chicago Air Races on a tour which includes the air centers of the following cities: Milwaukee, Cleveland, Buffalo, Albany, New York, Philadelphia, Washington, Dayton, St. Louis, Kansas City and Wichita.

The ship is powered with a Kinner C5, 190-horsepower engine, a product of the Kinner Airplane and Motor Company of Glendale. This particular engine is the first one of the new series released by the Kinner company. The combination of the Waterman plane and Kinner engine makes this airplane an all-Los Angeles product.

Specifications

Wing span	40 feet
Wing chord, (maximum)	7 feet
Wing chord, (minimum)	5 feet
Wing area	212 square feet
Length	27 feet 5 inches
Height	90 inches
Weight empty	2,050 pounds
Useful load	1,200 pounds
Gross weight	3,250 pounds
Wing loading	15.33 lbs. per square foot
Powder loading	17.10 lbs. per horsepower

Performance

High speed	140 miles per hour
Cruising speed	110 miles per hour
Landing speed	45 miles per hour
Climb (full load)	800 feet per minute
Time of take-off, (full load)	9.5 seconds
Take off run required	225 feet
Service ceiling	17,000 feet

DERBY-WINNING "LITTLE ROCKET"

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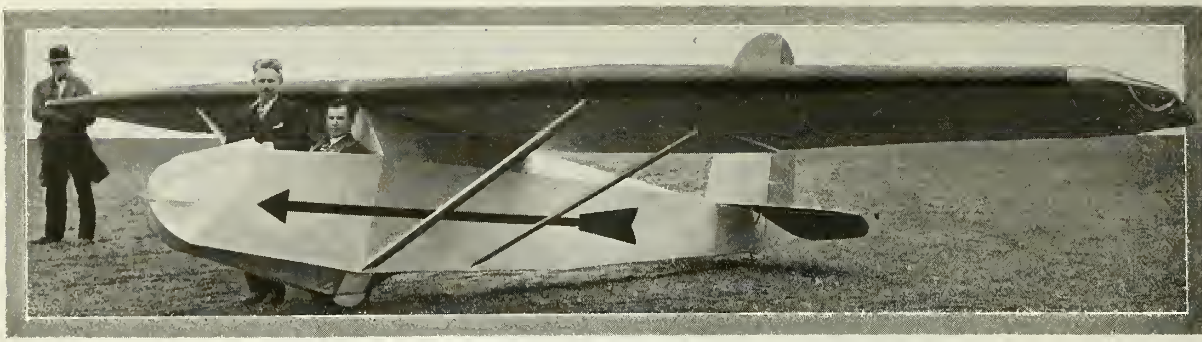


BAKER-McMILLEN TRAINING GLIDER

By R. E. Dowd

THE well-known woodworking firm, Baker-McMillen Company of Akron, Ohio, first attracted attention as manufacturers of gliders when the "Akron Condor" or "American Darmstadt" made its appearance about a year ago. This highly developed soaring plane was the result of the designing ability and experience of Frank Gross, formerly of Darmstadt University, Germany. The machine, under the skilful handling of Dr. Wolfgang Klemperer, gave a splendid account of itself. The builders, however, felt that its high cost, and its unusual refinement of design, which required experienced piloting, were not in keeping with present American demands for a commercial glider. Consequently, the design was not placed in production.

The builders were equally certain that the three-stage system of training so firmly rooted in Germany,—namely, the Zoegling or primary, the Pruefling or secondary, and the Professor or soaring,—would not be adopted generally in America. They reasoned that the only real excuse for a primary type's existence was its low initial cost and maintenance. From a performance standpoint the secondary seemed even better suited for training, giving the student pilot an added feeling of security because of its covered fuselage. Similarly, the soaring planes, unless made ultra-sensitive and responsive to control, could be handled by student pilots. In short, it was concluded that an all-purpose, or general utility, glider could be produced which would be suitable for training the student right through into the soaring stages of his training without change. When finally additional refinement was desired, a simple change to special large span wings could be made and the student would be able to cover his entire course by the use of a single machine of moderate price, with perhaps the added cost of a pair of soaring wings in the extreme case.

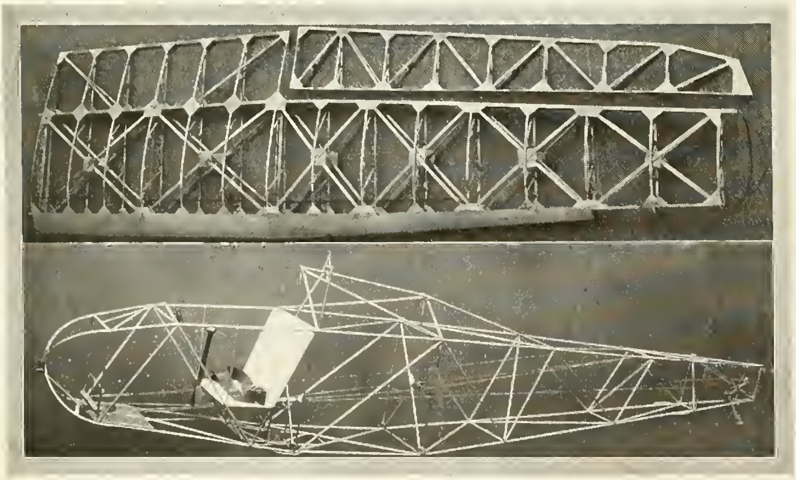
Such a large order all in one machine was a new experience for Frank Gross, designer, but the Cadet II now stands as evidence of how well he has met requirements. It is not a primary. It is not a secondary. Neither is it a soarer, but it is all these at once—a masterful compromise—an all-purpose training glider.

Recently at Elmira, N. Y., Pilot John O'Meara soared in a Cadet II for an hour and thirty-eight minutes. Three flights were made, each more than an hour, and each terminating only when the wind fell below six miles per hour velocity. At Akron, a group of students have been trained through a series of more than 500 flights without mishap. A glider club of girls, employees of the Goodrich company, have been flying a Cadet II regularly.

The Cadet II has many interesting features of construction. It is of the high wing, enclosed fuselage, monoplane type. The wings are braced to the fuselage by streamlined steel tube struts, permitting easy assembly without rigging. For reasons of simplicity the various component parts will be described separately.

Fuselage and Landing Gear

The entire structure is of 1025 specification welded steel tube construction. Four longerons are used, and the mounting for the plane is carried up from the two main stations in triangular form, thereby minimizing interference between fuselage and wings. The side frames of the fuselage are designed around the familiar Warren type of truss. The pilot's cockpit is large and roomy. A canvas seat is laced to structural members, giving both comfort and strength with low weight. At the front the longerons meet at a common point which is covered by a plate welded in position. This plate supports the nose hook, which is designed for automatic or manual release. A monowheel landing gear with peripheal brake is provided. Loads taken by the wheel are transmitted through the fuselage and struts to the wings. Steel tube wing tip skids and a rubber sprung tail skid complete the landing gear.

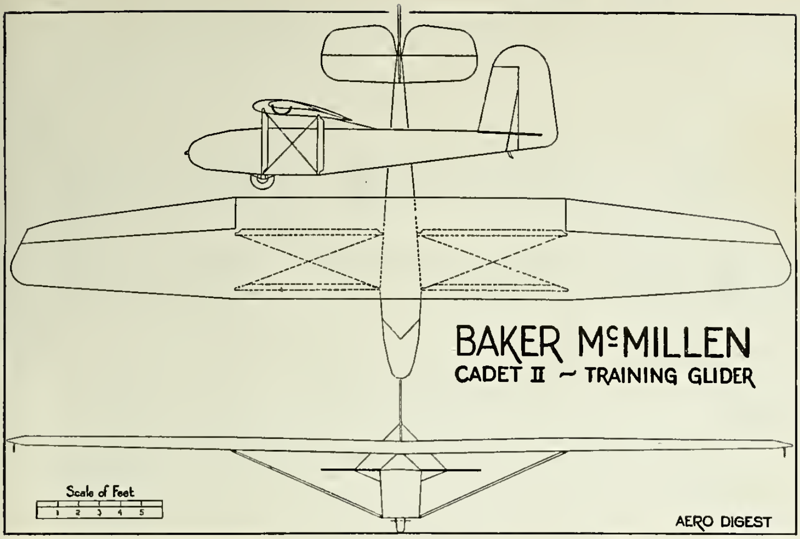


Wing and body construction of the Baker-McMillen training glider, Cadet II.

The Wings and Tail Surfaces

The wings are built up entirely of wood and fabric. Double spars of spruce are used, braced together with cross braces of T-section spruce for torsional rigidity. These braces are securely gusseted to the spars at panel points. The ribs are of a special profile developed by Dr. Lachmann of Germany. Originally the Göttingen 535, the airfoil was modified by Dr. Lachmann to a two spar section. Further changes have been made by the designer, Mr. Gross. The nose is covered with plywood. The wing fittings are chrome-molybdenum steel, and wing connection fittings have been designed to a factor of safety of 20. Nickel steel bolts to specification 2330 are used. The wing structure has a safety factor of nine, although the Department of Commerce requires only six over the high grade of attack conditions.

The tail unit is entirely of welded steel



tubing covered with fabric. The controls are generous in size and are effective at low speeds.

The cotton covering of both wings and tail is coated with five coats of dope. Regular coloring consists of silver fuselage and tail with orange wings, although special colors may be had at added cost.

The aileron control is through push and pull tubes, preventing the reversing of controls by improper hooking up. Elevator and rudder control is effected by the usual type of flexible cables.

The angle of incidence of the root wing sections is plus five degrees with the angle of flight under best gliding angle conditions and 15 degrees when the glider rests on the ground on wheel and tail skid.

Span	37 feet 6 inches
Length	18 feet 9 inches
Height	4 feet 6 inches
Weight empty	237 pounds
Weight loaded	407 pounds
Wing area (incl. ailerons)	162 square feet
Wing loading	2.51 pounds per square foot
Stabilizer area	9 square feet
Elevator area	8 square feet
Fin area	5 square feet
Rudder area	9 square feet
Sinking speed	3¼ feet per second
Gliding angle (actual)	1 to 15
Shock cord launching level ground	1,200 to 1,500 ft.
Altitude	100 feet
Duration	20 to 35 seconds
Soaring record to date	1 hour 38 minutes

METAL-CLAD CONSTRUCTION

METAL-CLAD is a sheet material combination of aluminum or dural and wood, bonded by a patented process. It may be used in the construction of fuselages, spars, drag struts, wing and leading edge covering, and for cabin lining and flooring.

Various combinations of the product possess the individual qualities essential to the particular service for which they are intended; besides light weight and strength, which are common to all, one type has rigidity, another resiliency, and so on.

Every type of Metal-Clad is made in essentially the same way; i.e., by binding the component parts together, the binder being uniform in thickness and creating a positive bond without air spaces or other defects.

The manufacturers of Metal-Clad are experimenting continually with different combinations of woods and alloys.

In the following lists, the sheet aluminum indicated is 2SH and the dural is 51ST. In the tables, Standard panel sizes are given in inches and the weights shown are in decimal parts of a pound per square foot. Thicknesses of materials are indicated in fractional and decimal parts of an inch.

Specifications of Metal-Clad for fuselage, leading edge, wings, etc.

Materials and Thickness	*Panel Size*	*Weight*
.010 alum. 1/28 mahogany....	34x94	.275
.010 dural., 1/28 mahogany...	28x94	.275
1/60 holly, .006 alum., 1/60 holly	24x72 & 30x94	.200
.006 alum., 1/50 maple	24x72 & 30x94	.162
.006 alum., 1/28 mahogany ..	24x72 & 30x94	.231
.006 alum., 1/32 plycore 3-ply	24x47 & 30x47	.256

When dented, this material springs back to the shape in which it was formed by merely tapping around the dent. It is unnecessary to get at the back of the dent, and therefore removal of the sheet or taking apart of the wing is avoided.

With little effort Metal-Clad can be formed to very small radii and to odd shapes, such as concave and convex surface on the same sheet, without being steamed or prepared in any other way. Steaming jigs are not required.

The material is not affected by weather conditions after it has been formed. It will not stretch, shrink, or warp.

Specifications of Metal-Clad for cabin lining, bulkheads, etc.

Materials and Thickness	*Panel Size*	*Weight*
¼ balsa, .010 alum., ¼ balsa.	33x94	.4375
⅛ balsa, .010 alum., ⅛ balsa.	33x94	.425
¼ balsa, .006 a um., ¼ balsa. 1/50 mahogany	24x72 & 30x94	.394
¼ balsa, .010 alum., ¼ balsa with ¼ spruce strips at edges	33x94	.469

The above cabin lining materials are those in greatest favor, but other combinations of wood and metal can be fabricated to specifications. Any thickness of commercial aluminum or dural can be used.

In installing cabin lining material, the edges of the panels are butted together and secured to an angle framework by drive screws, the holes for which are drilled in position. The joints then are filled with putty and the walls painted. If a better finish than paint is preferred, Metal-Clad can be obtained with a polished veneer of mahogany, walnut or other ornamental wood. Inverse marquetry, or metal with wood inlay, can be applied to Metal-Clad by the manufacturers, and attractive and artistic effects can be obtained.

Specifications of Metal-Clad for flooring, doors, etc.

Materials and Thickness	*Panel Size*	*Weight*
.010 alum., ½ balsa, 0.10 alum.	33x94	.656
.010 dural, ½ balsa, .010 dural	28x94	.656
.010 alum., ½ balsa core reinforced by ½ square spruce strips on 5″ centers, 0.10 a'um.	33x94	.6875
Same as above but with dural instead of alum.	28x94	.6875

Standard construction consists of one-half inch balsa wood planks, four and one-half inches wide, separated by one-half inch square spruce strips, making the center to center dimensions of the strips five inches. Panels also have these strips at each edge affording solid material for the attaching screws.

This reinforced material has the effect of deadening sound; its insulating properties protect the cabin from sudden changes of temperature; and it is light in weight.

Specifications of Metal-Clad for internal wing structure, etc.

Materials and Thickness	*Panel Size*	*Weight*
.010 alum., ⅛ 3-ply birch plywood, .010 alum.	35x95	.825
.010 alum., ⅛ 3-ply birch plycore	35x47	.878
.010 alum., 1/16 birch	35x94	.375
.006 alum., 1/60 birch, .006 alum.	24x72 & 30x94	.306
.006 a'um., 1/28 mahogany, .006 alum.	24x72 & 30x94	.306

In addition to the concerns which are experimenting with the different types of Metal-Clad, several large companies are using it in production, such as Ford, for lining cabins, Consolidated for flooring and wing covering, and Pitcairn for rib structures.

The combination of wood and metal is stronger than the same metal of equal weight, and the process of applying the wood to the metal adds strength to the finished product and creates a water-proof and practically indestructible bond.

States "Super Monoplane"

IN the September issue of AERO DIGEST a brief description and illustration of the "Rover Model B-1 monoplane" appeared; the article erroneously stated that this ship is "manufactured by the States Aircraft Company of Chicago." The real fact is that the ship described was merely taken over but never manufactured by the States company. Upon testing the ship the company decided to abandon the design, and an entirely new design was taken up. The new ship incorporating many superior features was developed to the production stage and has been awarded Approved Type Certificate 349. This new ship, known as the "Super Monoplane" is now being produced at the States Aircraft Corporation's factory, Chicago Heights, Illinois, under the management of Mr. H. H. Farmer.

The States Super Monoplane is a two-place tandem monoplane, designed and built to suit the needs of private owners and Government approved aviation schools. Seats are designed for parachutes. Dual controls are provided and the controls may easily be removed from the front cockpit. Instruments are located in the rear cockpit. Standard instruments include altimeter, tachometer, oil pressure gauge, oil temperature gauge, gasoline gauge and air speed indicator. A roomy baggage compartment is fitted with a lock.

This plane is powered with the Kinner radial air-cooled engine having dual ignition with Scintilla magnetos; an impulse starter is located on the left magneto. An adjustable stabilizer control is placed in a convenient position. The latest type Airwheels and oleo shock struts are used. Landing gear members are heat treated to a tensile strength of 140,000 pounds per square inch. Ailerons are of the Frise type and are controllable far below stalling speed. Parts are made up in jigs and forms to insure accuracy and perfect fit on replacement parts. Two 12-gallon fuel tanks are built into each of the two wing panels. Valves are so arranged that one or both tanks can be used at one time. Gasoline consumption at cruising speed is at the rate of five and one-half gallons per hour.

The standard model has yellow wings, stabilizer and elevator; blue rudder, vertical fin and fuselage, with a half-inch yellow stripe running the entire length of the fuselage. The upholstery and cushions are black or red. The floor board is covered with pyramid aluminum matting.

This plane is designed, engineered and factory managed by Government licensed men whose experience dates back as far as 1910.

Specifications

Wing spread	32 feet
Fuselage length	23 feet
Wing chord	6 feet
Height	8 feet
Oil capacity	2.5 gallons
Gas capacity	24 gallons
Weight empty	1,083 pounds
Weight loaded	1,635 pounds
Horsepower	90
Maximum speed	105 miles per hour
Cruising speed	90 miles per hour
Landing speed	35 miles per hour
Cruising range	4.5 hours
Climb	900 feet per minute
Ceiling	14,000 feet

The latest type Kinner-powered States Super Monoplane

DEVELOPMENT OF AIRWAY RADIO BEACON SYSTEM

BUREAU OF STANDARDS RESEARCH paper 159, by J. H. Dellinger, H. Diamond, and F. W. Dunmore. Research work on a radio beacon system for use on the airways of the United States has been under way at the National Bureau of Standards during 1926 to 1929. As a result of this work a system has been developed which fulfills the requirements for course navigation on the civil airways. A directive transmitter is employed on the ground, making possible the use of simple apparatus on board the airplane. A simple receiving set suffices to make use of all the radio aids provided. Visual indication is provided on the airplane instrument board by means of a tuned-reed instrument. The pilot observes the vibrations of two reeds. On the course the vibration amplitudes are equal. Off the course they are unequal, the reed vibrating with the greater amplitude being on the side to which the airplane has deviated.

Two types of beacon transmitters are described, the double modulation and the triple modulation. The former is capable of serving either two courses at 180° with each other or four courses at arbitrary angles. The latter serves 12 courses at any desired angles, and is adapted for use at any airport located at the junction of a large number of airways. Reed indicators for use with the double-modulation and triple-modulation beacons are described.

Descriptions are given of the receiving set and receiving antenna system developed. Airplane engine ignition shielding is also discussed.

REPORT EXPLAINS THEOREM OF LIFT DISTRIBUTION

THE proof of the theorem that the elliptical distribution of lift over the span is that which will give rise to the minimum induced drag has been given in a variety of ways, generally speaking too difficult to be readily followed by the graduate of the average good technical school of the present day. In the form of proof in N.A.C.A. Report 349, by W. F. Durand, an effort is made to bring the matter more readily within the grasp of this class of readers. The steps in the proof, briefly outlined, are as follows:

I. Given a basic distribution of lift across the span denoted by (a) with a second supplementary distribution denoted by (1). Then it is shown that the induced drag of lift (a) in the downwash due to lift (1) and the induced drag of lift (1) in the downwash due to lift (a) are equal, and that the total effect of the small distribution (1) on the induced drag will be measured by twice either of these small quantities.

II. Next two small changes are assumed in a basic distribution (a). These are represented by (1) and (2), and are further assumed to be equal in amount and opposite in algebraic sign, thus leaving the original lift unchanged in amount, but changed in distribution. Under these conditions it is then shown that in order for the distribution (a) to be that for minimum induced drag, the change in induced drag due to this small change in distribution must be zero.

III. It is next shown that for any pair of small changes, such as (1) and (2), the only value of the basic downwash which will meet the condition of step (2) is downwash constant across the span.

IV. It is known mathematically that the elliptical distribution across the span is that which gives a constant value of the downwash, and hence as a result of (1), (2), (3), this must be the distribution which will give the minimum value of the induced drag.

Report 349 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

RECENT AIRCRAFT PATENTS

THE following patents of interest to readers of AERO DIGEST were recently issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

Aeroplane with supporting surfaces subdivided by gaps. Joseph Ksoll, Breslau, Germany (No. 1,770,575).

Buffer for aircraft. Willis C. Ward, Orchard Lake, Mich. (No. 1,770,638).

Mooring device. Frank Short, Poughkeepsie, N. Y. (No. 1,770,675).

Method of loading airplanes. Charles F. Jenkins, Washington, D. C. (No. 1,770,700).

Tail-skid. Roscoe I. Markey, Buffalo, N. Y.; assignor of one-half to Fairchild Aviation Corporation, New York, N. Y. (No. 1,770,756).

Helicopter. John Kubish, Indian Orchard, Mass. (No. 1,770,788).

Aircraft safety motor. James V. Martin, Garden City, N. Y. (1,770,937).

Parachute-ejector. Ernest V. Stone, Long Beach, Calif. (No. 1,770,954).

Low-resistance aeroplane. James V. Martin, Garden City, N. Y. (No. 1,771,053).

Aircraft. Rudolf Hamburger, Brooklyn, N. Y. (No. 1,771,083).

Airplane landing light. Samuel W. Hyatt, Connersville, Ind.; assignor to Indiana Lamp Corporation, Connersville, Ind. (No. 1,771,086).

Adjustment of aeroplane-ailerons. Cesare Pallavicno, Milan, Italy (No. 1,771,230).

Aeroplane. William S. Ingram, Philadelphia, Pa. (No. 1,771,257).

Rope-guide for insuring the unfolding of parachutes. Karl T. Lendner, Hamburg, Germany (No. 1,771,261).

Aeroplane-propeller. Joseph Woll, Woodville, Pa. (No. 1,771,365).

Monoplane flying boat. Adolf Rohrbach, Wilmersdorf, Germany; assignor to Rohrbach Patents Corporation (of Delaware) (No. 1,771,512).

Airplane-wing. James F. Auld, Columbus, Ohio; assignor to D. L. Auld Co., Columbus (No. 1,771,567).

Airplane-stopping device. Bernarr MacFadden, New York, N. Y. (No. 1,771,578).

Aircraft-propeller. James R. Powell, Los Angeles, Calif. (No. 1,771,654).

Airplane. Herman Troll, Norwood, Ohio (No. 1,771,665).

Land and water aeroplane. Haim M. Perez, Newport Beach, Calif. (No. 1,771,724).

Landing method and apparatus for flying-machines. Johann J. Braun, Marbach, Germany (No. 1,771,727).

Airplane. George D. Haskell, Boston, Mass.; assignor to Baush Machine Tool Co., Springfield, Mass. (No. 1,771,847).

Airplane-brake. John W. Seiden, Lewistown, Mont. (No. 1,771,941).

Flying-machine. Simon Lake, Milford, Conn. (No. 1,772,049).

Helicopter. William P. van Lammeren, Voorschoten, Netherlands (No. 1,772,119).

Multi-cylinder irregular X-type engine. Glenn D. Angle, Cincinnati, Ohio (No. 1,772,124).

Stabilized airship. Frank Short, Poughkeepsie, N. Y. (No. 1,772,161).

Aircraft. Hubbe R. Wallace, Park City, Utah (No. 1,772,196).

Means for bracing cantilever wings against torsional deflection. Alan E. L. C. R. A. de H. Haig and Helmuth J. Stieger, London, England (No. 1,772,206).

Elevator system for loading and unloading dirigible airships. Thomas B. Slate, Grendale, Calif.; assignor to Slate Aircraft Corporation (No. 1,772,229).

Aeroplane flight brake. Emil J. Doehler, Buffalo, N. Y. (No. 1,772,388).

Aeroplane. Frank Perfesz, Pottstown, Pa. (No. 1,772,396).

Airplane with foldable wings. John J. Wargo, Oyster Bay, N. Y. (No. 1,772,405).

Aeroplane-propeller. Victor Ranta, Atland, Ga. (No. 1,772,521)

Aircraft. Edward B. Wilford, Merion, Pa. (No. 1,772,586)

Crankshaft construction. George J. Mead, Hartford, Conn.; assignor to Pratt and Whitney Aircraft Company, Hartford. (No. 1,772,631)

Arrangement for increasing the efficiency of lifting, traction, and propulsion means (in aircraft). Edouard J. Peter, Villemomble, France. (No. 1,772,680)

Brake apparatus for aircraft. Theodor Kollinek, Berlin, Germany. (No. 1,772,813)

Adjustable monoplane. Nicholas P. Mandrich, Brooklyn, N. Y. (No. 1,772,815)

Wing landing light. Sherman M. Fairchild, New York, N. Y.; assignor to Fairchild Aviation Corporation, New York. (No. 1,772,889)

Safety device for aeroplanes. Martin J. Reinhard, Chicago, Ill. (No. 1,772,962)

Floating station for aircraft. Alan J. Cobham, London, England; assignor to Alan Cobham Aviation Ltd., London. (No. 1,773,029)

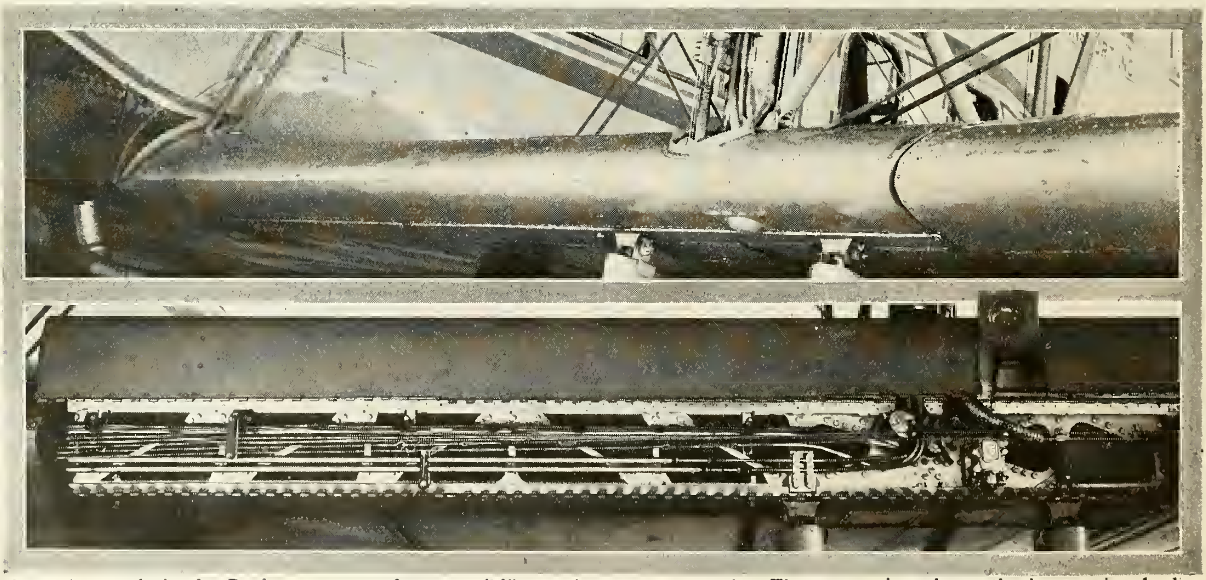
Airplane. Randolph F. Hall, Rochester, N. Y.; assignor to Lincoln-Alliance Bank, trustee, Rochester, N. Y. (No. 1,773,225)

Aircraft. Rossiter S. Scott, New York, N. Y. (No. 1,773,280)

Aircraft. Rossiter S. Scott, New York, N. Y. (No. 1,773,281)

Propeller-spinner. Carl F. Rauen, Dayton, Ohio; assignor to Bendix Aviation Corporation, New York, N. Y. (No. 1,773,319)

Aircraft construction. Joseph D. Bell, Philadelphia, Pa. (No. 1,773,340)



Provision made in the Boeing transport for accessibility to important controls. The upper view shows the lower wing leading edge with an engine nacelle strut; the lower view shows the hinged leading edge raised to permit easy access

TWO JACOBS AERO ENGINES

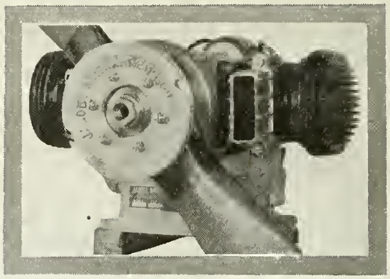
TWO new engines manufactured by the Jacobs Aircraft Engine Company, the 140 and the Midget, are now in production at the firm's plant at Camden, New Jersey.

The Jacobs 140 is a seven-cylinder air-cooled radial powerplant rated at 140 horsepower at 1,800 revolutions per minute, with a maximum horsepower of 160 at 2,000 revolutions per minute. This engine, which has been awarded Approved Type Certificate 31, is so designed that all adjustable parts are visible and accessible for adjustment. Every part is made of high-grade heat-treated alloy steel and aluminum. In service, engines of this model have flown 500 to 600 hours without a replacement, and valves have run 200 to 300 hours without grinding. The Jacobs 140 is now standard on the Waco 140.

The Jacobs Midget is a specially built aircraft motor for gliders. It is a two-cylinder 20-horsepower motor, adaptable to either pusher or tractor type—18 inches by 20 inches in size and weighing only 60 pounds complete with propeller and tank. This motor is finished in silver and black.

At the National Air Races, the Midget was flown in the Waco Glider.

Officers of the company are: Albert Jacobs, president; H. M. McFadgen, vice president; Robert Glendenning, vice president; and J. Story Smith, secretary-treasurer. Members of the board of directors are: Sanford Saltus, of the Ludington company; J. Brooks Parker, aviation insurance underwriter; and W. Laurence Saunders, president of the Aero Corporation of Philadelphia.



20 h.p. Jacobs Midget engine

"LO-EX" ALLOY FOR ALUMINUM PISTONS

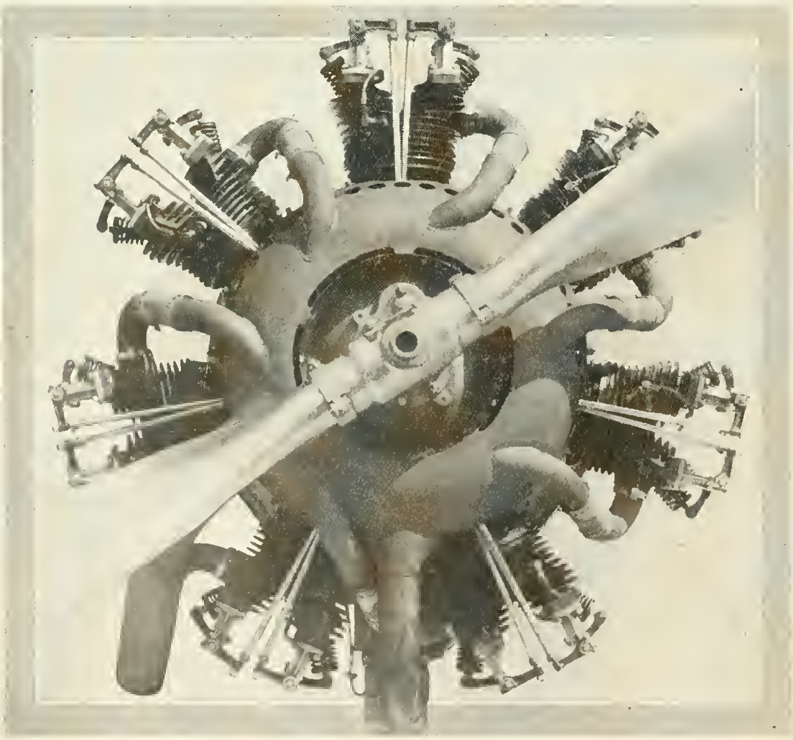
A NEW aluminum piston alloy for aircraft, automobile, bus and marine engines has been developed by the Aluminum Company of America. This alloy, which is produced as No. 132 and commonly known in the trade as "Lo-Ex" (meaning low expansion), is approximately fourteen per cent silicon with varying amounts of nickel, copper and magnesium. According to the producer, it has a lower coefficient of expansion, better thermal conductivity and improved bearing qualities. Its specific gravity is substantially less than that of the aluminum-copper alloy and about equal to that of pure aluminum. As a result of this combination of properties, pistons cast in No. 132 alloy can be fitted with closer clearances, form less carbon and have a greater resistance to wear.

This alloy is intended to meet the demand for a light alloy piston having a coefficient of expansion more nearly equal to that of the cast iron or steel cylinder in which it operates. In the majority of the light alloy pistons now in use, the difference in expansivity has been taken care of either by means of a flexible design, or by casting nickel-steel inserts into the piston structure in such a manner that the insert will partially control the expansion of the piston.

The coefficient of expansion of No. 132 alloy and Ni-Resist, a comparatively new variety of cast iron containing nickel developed by the International Nickel Company, are almost identical. When pistons in this new low expansion alloy are used in engines having Ni-Resist removable sleeves, they may be fitted with the same small clearances which are employed with cast-iron pistons operating in cast-iron cylinder blocks.

In a 500-horsepower radial aircraft engine, the use of this new low expansion piston material in place of the older aluminum-copper piston alloy reduces the total piston weight three pounds. This reduction in the weight of the pistons makes possible a reduction of one and one-half pounds in the counter balances.

The machining of heat-treated No. 132 alloy castings is readily accomplished on a commercial scale by the use of cemented tungsten carbide tools. The pistons may be ground on the same type of wheel commonly used for grinding other light alloy pistons. The wrist pin holes of pistons cast in Lo-Ex must be finished with a diamond tool in order to secure the full benefit of the alloy as a wrist pin bearing material. This is preferred practice with any aluminum piston alloy but is practically essential with No. 132 alloy.



Propeller end of the 140 horsepower Jacobs aircraft engine

DeVILBISS SPRAY GUN

A NEW spray gun for the application of airplane dope has been announced by The DeVilbiss Company of Toledo, Ohio. This gun has been on test for the past six months in several airplane plants. It was designed especially to speed up application of the first coat of dope and to produce a high uniformity of application.

This new spray gun is known as the DeVilbiss Type BD. Its operating principle is somewhat different from that of other spray guns now being used with airplane dope or other viscous material, the chief difference being that it is provided with a hollow needle around which the fluid leaves the nozzle of the gun in cylindrical form with air pressure within the cylinder to aid in the atomization of such heavy bodied and viscous material as airplane dope.

WORKING CHARTS FOR SELECTING PROPELLERS

IN N.A.C.A. Report 350, by Fred E. Weick, working charts are given for the convenient selection of aluminum alloy propellers of a standard form, to operate in connection with six different engine-fuselage combinations. The charts have been prepared from full-scale test data obtained in the 20-foot propeller research tunnel of the National Advisory Committee.

THE AIR SERVICES

FLEET MANEUVERS AT PANAMA CANAL

256 Aircraft, 3 Aircraft Carriers and 181 Surface Ships Will Participate in Maneuvers Next Winter

THE major tactical maneuver of the United States Fleet during the coming winter war games will be the defense of the Panama Canal from enemy attack by aircraft and surface vessels, according to a recent announcement of the War Department. These maneuvers will be held February 12 to March 24. More than 256 aircraft and 181 surface ships will participate. All available forces operating on the East and West Coasts will be utilized.

Present plans for the concentration of the fleet in the Panama Canal Zone contemplate the employment of three aircraft carriers and 181 other surface craft, including eleven battleships.

All units of the fleet will be maneuvered in tactical formations under the supervision of Admiral Jehu V. Chase.

Goodyear Constructing Non-Rigid Airship for Navy Department

CONSTRUCTION for the United States Navy of the envelope and control surfaces of a non-rigid airship has been started at the plant of the Goodyear-Zeppelin Corporation, Akron, Ohio. The airship will be used by the Navy for experimenting with fuel gas instead of gasoline for driving the two engines of 200-horsepower each which will be used to power the craft. This gas will be carried in a fuel bag located within the envelope and supported by a catenary, with fuel lines leading to the engines. Gasoline will also be carried in tanks located in the car as reserve fuel.

The car, which will accommodate a crew of six men, is being built at the Naval Aircraft Factory in Philadelphia.

The envelope will be 220 feet long, fifty-four feet in diameter and will contain 320,800 cubic feet of gas.

When completed, the ship will be nearly twice the size of the *Defender*, largest of the Goodyear non-rigid fleet, and one and one-half times the size of the Army and Navy "TC" and "J" type ships.

Bids Opened on New Aircraft Carrier

BIDS for the construction of an aircraft carrier, the first to be built as such from original plans, were opened by the Navy Department September 3. It is estimated that the construction of the new carrier will be completed in three years, this craft being the fourth in operation by the Navy, which has three ships being used as aircraft carriers at present: the *Lexington, Saratoga* and *Langley*. The first two were designed originally as cruisers and the third as a collier.

The new carrier was authorized by Act of Congress, February 13, 1929, to cost not more than $19,000,000, including armor and armament. This ship is designed to displace 13,800 tons. The *Saratoga* and the *Lexington* displace 33,000 tons each. Including the tonnage of these two ships in addition to that of the new carrier, the United States will have a total of 79,800 tons of carriers. The *Langley* will be replaced at any time, according to present plans.

Conduct Tests of Antiaircraft Directors

TESTS of three new antiaircraft directors at the Aberdeen Proving Ground are scheduled to be completed by Army officers November 1. Two of the directors were produced in Europe in accordance with U. S. Army Specifications, and the third was designed and manufactured in this country. The tests are being carried out under the directions of the Chiefs of Ordnance, Coast Artillery, Army Air Corps and Corps of Engineers. In addition to the antiaircraft directors, a number of new guns and other equipment will be tested.

The directors being tested were designed to determine continuously and immediately the point of advance of the target at which they are aimed, in addition to all extraneous conditions on the flight of the projectile which is fired; this is generally considered the chief problem of an antiaircraft defense system. The development of the director built in this country and being tested at the Aberdeen Proving Ground was started at the Frankford Arsenal in 1924. Since that time its design has been constantly improved with various tests being conducted regularly.

PROMOTION of Lieut.-Col. Thomas C. Turner, Chief of Marine Aviation, to the rank of colonel, effective September 1, has been announced by the War Department. The vacancy which Colonel Turner filled was brought about by the resignation of Col. George C. Reid, USMC, retired.

Air Corps Studies Night Flying

A SERIES of flights between Washington, D. C., and Dayton, Ohio, for the purpose of studying the various methods of night navigation over territory where no lighted airways exist, have been conducted by Maj. A. H. Gilkenson, Lieut. Donald L. Bruner and Lieut. H. P. Rush of the Air Corps. Flight instruments alone were used to guide the pilots on the Washington-Columbus leg of the route from the Capital to Dayton. There are no lighted airways on this route until Columbus is reached. When possible, the lights of cities flown over were used to check the course.

On a flight made recently from Washington to Dayton, Major Gilkenson and Lieutenant Bruner flew a plane equipped with a radio beacon used in connection with the beacon operating from Wright Field, Dayton. Lieutenant Rush flew a plane by compass. A study of various night lighting facilities at the different fields on the route has been conducted by Lieutenant Bruner.

EIGHTY Air Corps Officers have been detailed under special orders of the War Department to duty as students at the Air Corps Technical School, Chanute Field, Rantoul, Ill. There will be more officers attending the various courses at this school during the school term this fall than at any previous time in the history of this institution. These officers have been directed to report to the Commandant not later than October 2. Thirty officers will pursue the armament course and thirty the maintenance engineering course. The photographic and communications courses will each be attended by ten officers.

LIST SERVICE PILOT FLYING

THE number of flight hours per pilot in the Naval Air Service during 1929 averaged 216, according to an official estimate recently made public. The average number of flights per pilot in the Naval Air Service has increased more than 300 per cent since 1922 in which year the average was 72.4 hours per pilot.

The average number of flight hours per pilot in the Army Air Corps during 1929 was 175, according to the report.

In explaining the differenec between the flying time per pilot in the two services, David S. Ingalls, Assistant Secretary of the Navy for Aeronautics, pointed out that the Navy has more requirements in aviation that require more flying than does the Army Air Corps. He gave as one example, the operation of planes with the fleet, these maneuvers sometimes requiring a certain duration of flight in order to carry out the normal operation of the surface craft. Mr. Ingalls said that the Air Corps has a greater number of pilots than the Navy Department as compared with the number of airplanes, the concentration in the number of pilots resulting in a decrease in the number of hours of flying in the Air Corps as compared with the Navy.

Studies of the flying time of Navy pilots have disclosed that as the flying time increases the accident rate decreases. At 100 hours of flying the accident rate is .26, decreasing as the number of flying hours increase; at 400 hours of flying the accident rate is .16. Figures compiled on Naval aviation show that pilots who have between 200 and 300 hours have a greater safety record than those with between 100 and 200.

The greater part of Navy flying is composed of flying for some specific operation, mainly with the fleet, or in training. The flying hours of the Navy are divided into

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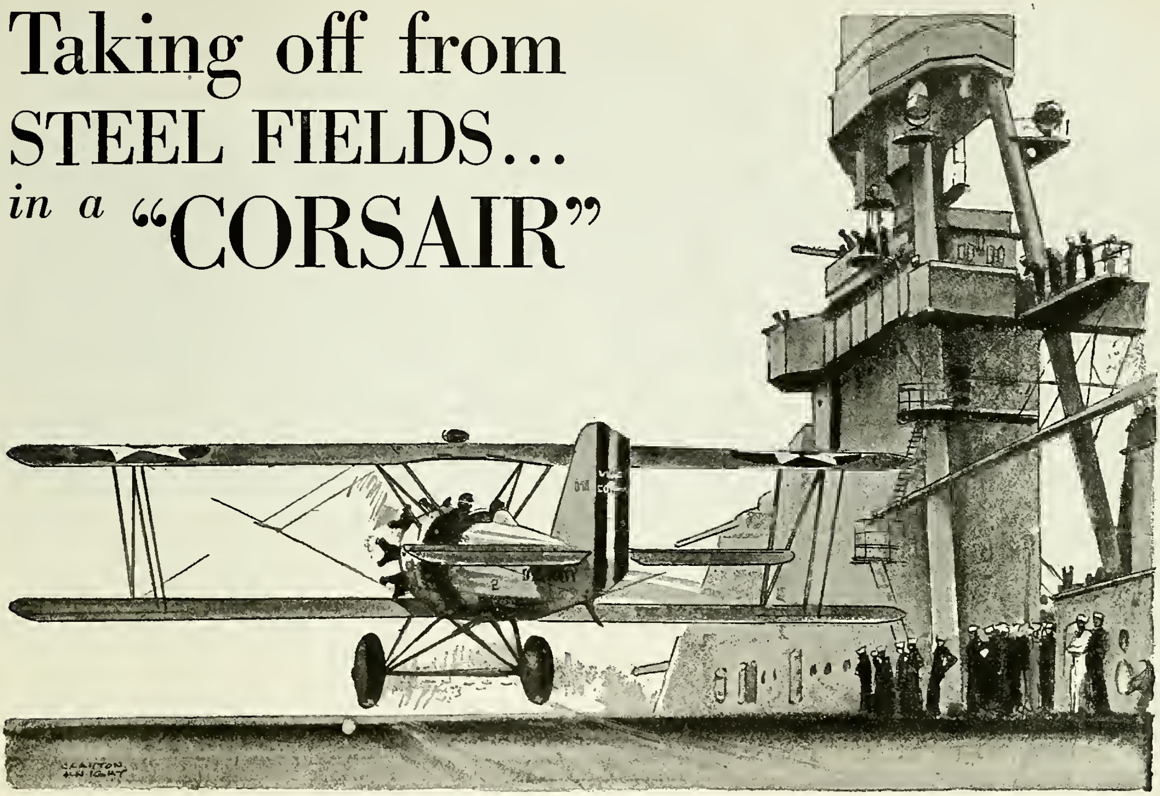
Taking off from STEEL FIELDS... *in a* "CORSAIR"



One way to get an idea of flying from the deck of an aircraft carrier . . . and landing on the same steel field . . . is to mark off the overall length and beam of a carrier on an ordinary field. Look at it from the air. It's a mighty small area.

Even with a carrier steaming into the wind at twenty to twenty-five knots, a plane has to be fast for deck take-off. For deck landing a plane must be rugged beyond all ordinary standards of flying to stand the strain of the unyielding surface and the arresting gear. And its control must be positive to compensate instantly for the roll and pitch of the ship.

"Corsairs" stand this exacting service and stand it well. Sound design and rugged durability have won them adoption as standard observation ships in the U. S. Naval Air Service. And the same qualities have earned for them in civil life the enthusiastic approval of many nationally known pilots who know their airplanes. CHANCE VOUGHT CORPORATION. Division of United Aircraft & Transport Corporation, East Hartford, Connecticut.

CHANCE VOUGHT  CORPORATION

(*Continued from preceding page*)

three divisions: training, operational with the fleet and activities based on shore, including incidental flying. Experience has shown that more hours per pilot are flown in training than for any other purpose.

AIR CORPS LETS NEW CONTRACTS

CONTRACTS for Army Air Corps equipment, involving a purchase price of $306,657.98, were recently approved by the Assistant Secretary of War. The companies signing these contracts are the Stout Metal Airplane Company Division of the Ford Motor Company, Dearborn, Michigan; Pratt and Whitney Aircraft Company, Hartford, Conn.; and the Detroit Aircraft Corporation, Detroit, Mich.

The Stout Company will construct for the Air Corps four Model C-4A trimotor planes at a cost, including spare parts and drawings, of $157,391.40. These planes will be powered with Pratt and Whitney R-1340-D Wasp engines. The Pratt and Whitney company received a contract for $132,629.58, covering twenty-four Type R-1340-D Wasp engines and spare parts. Twelve of these engines will be installed in the Ford planes contracted for. The remainder will be used as spare engines. Under the terms of the contract with the Detroit Aircraft Corporation, the Air Corps will receive in the near future one Lockheed transport plane, powered with a single air-cooled engine. This plane, which will cost $16,637, will be powered with an SR-1340-C Pratt and Whitney Wasp engine.

TEN Boeing P-12C single-seater, Wasp-powered fighters have been delivered to the Army Air Corps on the contract for 131 planes. Lieut. Oliver Gothlin, Army Air Corps representative, will test fly these ships. The P-12C's are similar in design to the P-12B with the exception of a ring cowl over the engine and a straight type landing gear. The P-12's have a speed of 184 miles per hour with military load.

CAPT. WILLIAM D. WHEELER of Scott Field, Belleville, Ill., has been transferred to Langley Field. First Lieut. Leslie Holcomb has been ordered to report from Hawaii, and Second Lieut. Joseph Brodrick to report from reserve. Second Lieut. Flint Garrison, Jr., St. Louis, has been ordered to duty at the Air Corps Maintenance School, Chanute Field.

New Enclosure for Blind Flying

A NEW type of enclosure for blind flying has been developed by the Materiel Division, Wright Field, Dayton, Ohio. The enclosure is detachable and light-proof. Its construction incorporates permanent fastenings and shadow-proof glass with a removable top cowl. The enclosure was developed by the Materiel Division to replace the original type of enclosure of canvas and a steel framework which was found unsatisfactory by the division after numerous tests. The new enclosure is designed for installation in the O-2H type airplane.

Air Corps Will Ferry Planes from Panama Canal Zone

THE Army Air Corps has adopted as a regular practice the transferring of military airplanes to and from the Panama Canal Zone and the United States under their own power. This policy was effected after the Air Corps had definitely established the practicability of ferrying military airplanes between these two countries.

In line with this practice of the Air Corps, four PW-9C Pursuit planes, under the command of Captain Louis N. Eller, took off from France Field, Panama Canal Zone, September 1, en route to the Repair Depot at Duncan Field, San Antonio, Texas, and arrived at the destination five days later. On this flight the planes flew over Costa Rica, Nicaragua, Honduras, Salvador, Guatemala and Mexico. At the San Antonio Air Depot the planes were overhauled and shipped to other stations of the Air Corps.

Transfer of 34th Division Air Service

[L. F. YOUNGSTROM]

HEADQUARTERS of the 109th Aero Squadron have been moved from Wold-Chamberlain Field, Minneapolis, to the St. Paul Municipal Airport. Members of the squadron began moving their equipment about September 15. They will be housed in the new municipal hangar, recently completed.

The 109th Photo Section and the 109th Medical Section are moving with the 109th Aero Squadron. These three comprise the Thirty-fourth Division Air Service. The entire organization is under the command of Major Ray S. Miller, of St. Paul. The equipment, including all machinery and facilities for servicing them, photo and medical apparatus, is valued at $500,000.

The squadron has a membership of nineteen officers and ninety-five men. Eight men are kept on permanent duty at the hangar as mechanics, riggers and machinists. The annual payroll is between $30,000 and $40,000.

The squadron, organized in 1920, has been under the command of Major Miller since that time. The new hangar is 200 feet by 120 feet, and is of modern steel construction, the third of its kind at the St. Paul airport.

THE Navy Department's new two-place fighter, XF8C-4, built by the Curtiss Wright Company for the Bureau of Aeronautics, has been inspected at the Naval Air Station, Anacostia, D. C. The XF8C-4 is an improvement of the XF8C-2 which was delivered to the Navy by the Curtiss company several months ago.

EXPERIMENTS to determine the stress and strains set up by Naval service type fighting planes during dive bombing tests were conducted recently at Langley Field, Va., by the Bureau of Aeronautics, Navy Department, in coöperation with the National Advisory Committee for Aeronautics. The personnel of the Laboratory of the N. A. C. A., at the field installed the equipment which determines the acceleration resulting from high speed power dives. Pilots of the Naval Air Service flew the planes, simulating dive bombing tests. Following this, engineers of the N. A. C. A., determined the stress and strains set up upon the various strength members of the aircraft.

246 Air Corps Flying Students Will Begin Training November 1

A TOTAL of 246 students will begin November 1 the eight-months' course of flight training at the two Primary Flying Schools of the Army Air Corps, one at Brooks Field, San Antonio, Texas, and the other at March Field, Riverside, Calf. Students successfully completing this course will be transferred to the Flying School at Kelly Field, San Antonio, Texas, for a four-months' advanced course.

Included in this new class are eighty-seven newly commissioned 2nd lieutenants of the Regular Army, who graduated from West Point last June; three officers from other branches of the Regular Army; 131 civilian candidates; twenty-four enlisted men of the Army Air Corps; and one enlisted man of the Infantry. One hundred and twenty-four of these students will begin training at Brooks Field, including three officers of the Regular Army, forty-one West Point graduates, nineteen enlisted men and sixty-one civilian candidates; and 122 students will be stationed at March Field, including forty-six West Point graduates, six enlisted men of the Regular Army and seventy civilian candidates. All of the enlisted and civilian candidates, totaling 156 in number, will, with the exception of the technical sergeant who retains non-commissioned status, undergo training as Flying Cadet.

Rear Admiral Marshall Qualifies As Transport Pilot

REAR ADMIRAL ALBERT W. MARSHALL, commandant of the Pensacola Naval Air Station, has qualified for a transport license for both landplanes and seaplanes. In 1926 Admiral Marshall qualified as Naval Aviator while he held the rank of Captain. Admiral Marshall has had command of the aircraft squadron of the scouting fleet and those of the battle fleet. He also commanded the aircraft carrier *Lexington*, December, 1927, to August, 1928. He has been in command at Pensacola since May 19, 1929.

Conduct Tests of the XPT-7

TESTS of an XPT-7 low-wing monoplane to determine its suitability for adoption for use in primary training, were recently reported scheduled at March Field, Riverside, Calif. The ship was flown from Wright Field, Dayton, Ohio, to March Field by Lieut. Wendell H. Brookley. The XPT-7 is powered with the Kinner YR 370 of 100 horsepower. According to reports, the XPT-7 may be substituted for the PT-3 now in use if the results of the tests are satisfactory. Following the tests at March Field, the ship will be subjected to further tests at Brooks Field, San Antonio, Texas.

WESTERN NEWS

FLYING CLUB OF CALIF. OPENED

DEDICATORY ceremonies of the Flying Club of California and the opening of the organization's new clubhouse at the Grand Central Airport, Glendale, were held September 13. Victor M. Clark, secretary-manager of the club, was master of ceremonies, aided by the entire membership of the club as a committee.

Aerial events held in conjunction with the dedicatory ceremonies included junior and senior model airplane contests, exhibition flying by members of the club, a dead stick landing contest which was won by Earl Ovington, and a balloon-bursting competition in which Tommy Tomlinson of the original Sea Hawks placed first. A diving and swimming meet was on the program of events, these contests being held in the outdoor plunge and swimming pool which has been constructed on the grounds for the accommodation of members and guests. Tennis matches were held during the afternoon on the club's own courts. Other facilities provided on the club grounds include a barbecue table built to represent a large monoplane with the seat for the presiding officer in the cockpit.

In the evening a display of fireworks followed by dancing was included on the program of events marking the opening of the club. The Flying Club of California is a non-profit organization organized to promote a feeling of good-fellowship among the members of the industry and the general public interested in aviation.

Survey Aviation Activities in the Southwestern Section

REGULARLY each month in 1930, the Southwestern section of the United States, comprising California, Arizona and New Mexico, has recorded more commercial aviation activities than any similarly sized area in the world, according to the results of a survey recently announced by officials of T. A. T.-Maddux Air Lines. August surpassed all previous months—and the Southwest retained first place for total volume monthly business handled since man learned how to fly.

Los Angeles and San Francisco lead in the amount of financial returns. Each city surpasses London, Paris and Berlin combined in total amounts taken for air transportation tickets in any one month. In the number of passengers carried, either city equals the monthly passenger record of all three of these European cities.

Figures on the operation of T. A. T.-Maddux Air Lines' Western division, as announced by H. W. Beck, traffic manager, show that in August several new high marks were established by the company. The Western division handled 3,132 passengers, 1,376 of whom were carried on the North Coastal route between San Francisco and Los Angeles; 1,127 on the South Coastal route between Agua Caliente, San Diego and Los Angeles, and 629 on the transcontinental route between Eastern points and Los Angeles.

INDEX TO NEWS ITEMS FROM WESTERN STATES, ETC.

46,000 Passangers Transported by Air Ferries, Ltd.

MORE than 46,000 paid passengers were transported across San Francisco Bay by Air-Ferries, Ltd., from February 1 to August 7, according to a recent announcement of company officials. An average of 254 passengers were transported every day, or one passenger carried every 2.2 minutes of operation. One peak day 974 passengers were carried, or five passengers every three minutes.

Traffic in the first three weeks of August showed an average increase of thirty per cent over the corresponding weeks of April, May and June. A questionnaire issued to passengers revealed that eighty-one per cent of the persons using the line did so because of the element of time saving.

Air Ferries serves passengers of West Coast Air Transport and Western Air Express, to and from San Francisco, effecting a saving of thirty minutes over water ferries.

Charges at Oakland Municipal Airport Are Reduced

NEW schedules of charges for Oakland Municipal Airport operators, which are lower than previous rates, have been announced by the Board of Port Commissioners. The new rates, adopted after a study of charges at other airports at the request of local pilots, are designed to benefit the smaller operators at the field in particular.

Owners of small type planes will pay approximately $10 less per month for the storage of their ships. Charges for the commercial operation of planes of this type have been decreased practically one-half.

Under the new rates, monthly charges for hangar storage range from $25 for planes under thirty-foot wing span, to $100 for planes with wing span of more than eighty-five feet. Commercial operation fees have been fixed at $10 per passenger place per month. Charges previously made for the use of night lighting equipment have been abolished.

The Board has also created a new schedule of charges on a yearly basis which materially reduces the hangar rent of Oakland Airport tenants.

A TELEPHONE conversation between a pilot in flight over Wichita, Kan., and a ground station at Los Angeles using Western Air Express equipment was recently effected, according to Jack Franklin, superintendent of communications. The operator talked with one of the planes of W. A. E. in flight over Wichita, en route to Kansas City, a distance of 1,000 miles.

Mr. Franklin announced that by using a shorter wavelength, conversations between planes and ground stations now can be regularly conducted without interruption for a distance of 300 miles.

The new wavelength of 53 meters is employed by substituting receiving and sending sets which have operated on 98-meter wavelengths. The 1,000-mile reception was made after dark, and it is believed that the newer equipment will produce equal results during daylight.

FORM WOMEN'S AERO CLUBS

AERONAUTICAL clubs for women are being founded on the West Coast by Mrs. Ulysses Grant McQueen of Los Angeles, founder and vice president of the Women's International Association of Aeronautics, and vice president of the Aero Educational Research Organization of Pasadena.

The organizations are non-political, according to Mrs. McQueen, and junior branches for girls from fifteen to twenty-one years of age, form important divisions.

Eight of these clubs have been formed during recent months. The Women's Aeronautic Association of Portland, Oregon, was founded August 13, with the following officers: Mrs. Edna Christofferson, president; Miss Dorothy Hester, vice president; and Mrs. Edith Foltz, president of junior division.

On August 22, Mrs. McQueen organized the Women's Aeronautic Association of Seattle, Washington, with forty-six charter members. The following officers have been elected: Mrs. C. Keen, president; Mrs. Logg, secretary-treasurer; and Miss Virginia G. Ogden, president of junior division.

The Women's Aeronautic Association of Canada was organized August 27 at Vancouver with fifty-five charter members. The first aviation luncheon of this association was held September 2, attended by women and girl university students interested in aeronautics.

Standard Flying Schools Establishes Second Branch

A BRANCH of the Standard Flying Schools has been established on the Municipal Airport, Ontario, Calif. This school is the second branch established by the Standard company during the past six months and is another link in a chain of such schools announced under the expansion program of the Aero Corporation of California for the coming year.

The first branch of the Standard Flying Schools was established at the Santa Paula airport six months ago. The establishment of the second branch followed an investigation of San Bernardino County, which revealed the lack of a single commercial flying school in the entire county.

THE Standard Flying Schools have secured a new form of aviation insurance, fully protecting the student flier during day or night instruction or solo flying, in the same manner that modern automobile insurance protects the automobile driver. The new insurance gives the student complete property damage and public liability coverage. As in modern automobile insurance, accidental damage, fire, theft, wind-storm and tornado coverage has been secured on planes of the Standard Flying Schools while under control of the student pilot. This complete coverage was obtained by the Standard Flying Schools as a result of their record over the past six years and through their affiliations with Western Air Express.

CONTACTS

[By FRANK E. SAMUELS]

WHILE on a recent trip to San Diego we we pleased to note that aviation in this territory has suffered less from the recent general business depression than it has at any other part of the West Coast. A feeling of optimism pervades among the members of the industry, and everyone reports a healthy and gradual increase in business.

AT the Claude Ryan Flying School the blackboard which lists the names of the students, the hours for their instruction, grade of course, etc., shows by actual count an enrollment of sixty-one students, who are taking the various courses, from ground course to transport pilot. Mr. Ryan reports a number of sales of Great Lakes planes, and is more than pleased with the volume of passenger flying business being done at the field.

AT Lindbergh Field, the Airtech School of Flying is always a busy place. Doug Kelly, in charge of flying instructions, reports one of the largest enrollments of students in the history of the school. A large strip of the airport is being used for glider instructions, and is kept busy from early morning until dark. Continuous improvements are being made at the airport. A 100-foot highway along the east side is just about completed, and the contract for a seventy-five-foot concrete apron, running along the entire boundary fence, has been let. A new fireproof administration and office building is under construction.

A CALL at the Bowlus Sailplane and Glider plant found Mr. Bowlus hard at work finishing his latest creation, a two-place, dual control sailplane for glider instructions. The cockpit has plenty of room for student and instructor, side by side, and the dual control is for the purpose of giving the student confidence before taking off for solo flight.

A SHORT call was made at the Solar aircraft plant. The company, having received the Department of Commerce license for their all-metal cabin monoplane, is marking time, giving their product a thorough testing before going into production. Their first plane is quartered at the Lindbergh Airport, and is kept busy making short passenger flights.

A PLEASANT visit was made with Donald Hall. Mr. Hall is hard at work developing a new design of airplane.

A VISIT with H. A. Erickson, the "Flying Photographer," is not only a pleasure, but is always productive of some items of interesting news. The War Department of the Mexican government is so well pleased with a recent aerial photographic job Mr. Erickson just completed that arrangements have just been made to have three officers of the aviation branch of the Mexican army enroll with Erickson to take a complete course in aerial photographic mapping. A contract to map a very large territory has been awarded him. These officers, using their planes, will do the actual photographic work. So large is the territory to be mapped that he has been requested to open a branch studio at Mexico City, where he will be able to supervise the actual finishing of the work on Mexican territory.

HAL R. WELLS was recently appointed general manager of the Los Angeles Metropolitan Airport. This position was formerly held by Waldo Waterman, who is now devoting his time demonstrating his new plane. Hal is well and favorably known out here.

CALIFORNIA

A FOUR year course in commercial aviation in the College of Commerce, leading to the degree of Bachelor of Science in Business Administration, and a four-year course in aeronautical engineering in the College of Engineering, leading to the degree of Bachelor of Science in Mechanical Engineering, began at the University of Southern California when the 1930 fall semester opened, September 15.

The Harris M. Hanshue Chair of Commercial Aviation, endowed by the Western Air Express and named for its president, and the James A. Talbot Chair of Aeronautical Engineering, endowed by the Richfield Oil Company and named for the chairman of its board of directors, were established at the University of Southern California this fall.

WILLIAM E. ARTHUR, president of the National Airport Engineering Company, Ltd., Los Angeles, announces that he has appointed Monte C. Abrams as his assistant. Mr. Abrams organized and was formerly traffic manager of United Air Express, and was formerly affiliated with the Aviation Department of Bancamerica-Blair Corporation of New York City.

A COURSE in airplane transportation organized by Earl W. Hill, professor of traffic and transportation in the College of Commerce and Business Administration of the University of Southern California, has been adopted for use in California high schools by the California State Advisory Committee on Aeronautical Education. The State Curriculum Committee has designated the course under the phase of social science. Dr. Hill is co-auther of "Aeroplane Trans-

(*Continued on next page*)

Boeing low-wing all-metal monoplane equipped with special cowl and retractable landing gear

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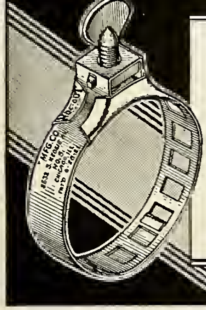

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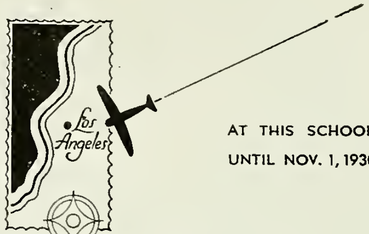

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(California News continued)

portation," the textbook which is to be used; it is largely the work of Adam E. Diehl, a graduate student at Southern California.

ALAMEDA

[H. V. WALDORF]

PREPARATIONS are being made to construct two additional hangars at the San Francisco Bay Airdrome. The hangars are to be 440 feet in length and are to be modeled after the large one recently completed at the field. It is expected that the new hangars will be placed in service next spring.

THE new type oyster shell runways at San Francisco Bay Airdrome were planned by C. H. Monroe, manager of the Bay Shell Company of San Francisco. First tests of the composition were made on roads leading to the company's plants on South San Francisco Bay.

THE Curtiss-Wright Service organization has been formed at Alameda Airport to operate a repair service for airplanes. Paul Jenks is head of the service which is a subsidiary of the Curtiss-Wright Corporation.

OAKLAND

[H. V. WALDORF]

A CHECK of intercity airplane operations was made recently at Oakland Municipal airport.

The following figures are the result: Incoming, 1929—5,037 planes, 9,467 passengers; incoming, 1930 (to August 15)—2,634 planes, 7,075 passengers; outgoing, 1929—5,023 planes, 10,059 passengers; outgoing, 1930 (to August 15)—2,656 planes. 7,128 passengers.

The operations for August were as follows: Landings, other than student, 1,671; student landings, 7,214; transport planes, 331; transient planes, inbound, 159; and outbound, 155; passengers, air taxi, 2,037; others, 1,006; and students enrolled, 338.

A GLIDER club has been formed at Livermore, thirty miles east of Oakland Airport. Flights are being made in Altamont Pass. The club has a membership of twenty-five.

THE Sorrenti Aviation Corporation, incorporated for $1,000,000, has been formed in Berkeley, Calif., to manufacture a new type safety plane. No details of the craft have been announced. The board of directors include S. S. Sorrenti, M. Sorrenti, Otto Morgensen, George F. Buck and M. E. Singleton.

SAN DIEGO

[L. M. EARL]

CONSIDERABLE interest is maintained at Ryan Airport, San Diego, by the staging of public demonstrations of advanced aerobatics, balloon bursting contests and races every Sunday. Only those holding transport pilot licenses are permitted to engage in these activities. Great Lakes Sport Trainers are used.

THE Russell Lobe Parachute Company, of San Diego, recently announced the results of long and extensive experiments with a parachute for lowering planes to the ground. As a result of these experiments they now have on the market a parachute for this purpose.

ALL flight and ground school students of the T. C. Ryan Flying School and Pacific Technical University, were recently taken on a special inspection trip of the Aircraft Carrier *Saratoga*.

This carrier and its sister ship, the *Lexington*, make their permanent home in Southern California waters and frequently lie at anchor in Coronado Roads, just outside of San Diego Bay.

ARIZONA

[H. G. WILSON]

AFTER keen competition among several Arizona cities to secure stops on the air mail route, officials of the Department of Commerce have announced that three stops will be made in Arizona—Phoenix, Tucson and Douglas. From the West the stops will be: San Diego, Phoenix, Tucson, Douglas and El Paso. Emergency fields will be placed thirty miles apart and will be lighted. A beacon will be built between each field fifteen miles apart. The fact that Tucson had a well-lighted airport was one of the factors in the establishment of a stop here. Construction work will probably start before November.

APACHE AIRLINES, INC., has made application to extend its present passenger and express service between Globe-Miami district and Phoenix to Prescott.

OPERATION of Phoenix Sky Harbor's $250,000 airport has been transferred from Scenic Airways, Inc., to Goldtrap and Lee, partnership of Charlie Goldtrap, former chief pilot and operations manager of Scenic Airways, and Edward Lee, airplane pilot.

WASHINGTON

[C. M. LITTELJOHN]

THE Continental Flying School has established headquarters in its new building at Boeing Field, Seattle. Among the new equipment provided is the new Parks training plane, equipped with dual control. Students are prepared for commercial and transport license examinations.

Boeing Women Employees

PHASES of plane building at the big Boeing factory at Seattle are in the hands of skilled women workers. The wing department especially employs a number of them for the purpose of sewing airplane cloth on the wooden wing frames. The seamstresses work under the direction of the foreman, the only man in the wing covering department, who is employed to give directive effort and coordinate their work. Other women are employed in the plating department in the preparation of small fittings and bolts for the electroplating process.

A BEACON light with many new attachments will be installed at the municipal airport, Everett, Wash. Arrangements are being made for broadcasting weather observations from Everett over the United States by communication to Boeing Field, Seattle.

AN AIRPORT for their joint use is being sought by Bremerton and Port Orchard. The Chamber of Commerce of Bremerton—the Navy Yard city of Puget Sound—and a committee of Port Orchard, nearby, are studying available sites, especially the land at the head of the bay which has long been under consideration for the development of an airport.

A GROUP of improvement projects requiring the expenditure of approximately one-half million dollars are on the program for 1931 at Boeing Field, Seattle. Improvements planned include the extension of the main runway 4,000 feet, making a total of 8,000 feet of landing area; the lowering of high tension wires and installation of obstruction lights; extension of cross runways; construction of two fireproof brick hangars to supplement the two already in use; installation of floodlights for night operations; improved drainage facilities; complete border lights; cover crops to add humus to soil so turf can be grown. One of the hangars would be for the use of the Army Air Corps and the other would contain space to be rented by the county.

AUGMENTING its Boeing-built equipment, the Varney Air Lines of Seattle have added two more four-passenger mail planes to the seven in operation. These new planes have been placed on the Seattle-Portland run. They are provided with radio telephone apparatus for plane-ground communication and space for four passengers and 500 pounds of mail cargo.

OREGON

[F. K. HASKELL]

HAL E. HOSS, Secretary of State, has ordered all State traffic officers to enforce the laws regulating the operation of airplanes, particularly those who use the Oregon beaches for landing fields. The Oregon law provides that all airplanes operating in Oregon shall be licensed by the State Department, subject to recommendation by the State Aeronautics Board.

A COMMITTEE has been named by the Portland chapter of the National Aeronautic Association to confer with Oregon State Board of Aeronautics on the proposed legislation for aviation, which will be presented at the next session of the State Legislature. The committee is composed of L. V. Hickam, Major Howard C. French and Lee B. Jamison.

THE air tour sponsored by the Pacific Northwest Air Tour Association, which visited twenty-two cities and traveled almost 2,000 miles in Oregon, Washington and Idaho, was a financial success, according to Charles A. Reynolds, treasurer.

IDAHO

[I. M. DURNIN]

JOE D. WOOD, Commissioner of Public Works for Idaho, has announced that Idaho will adopt, with the coöperation of the United States Bureau of Roads, a new system of conducting the reconnaissance survey of highways. The work will be done by means of an aerial camera.

BOISE supplies more airplane passengers for the Varney lines than any other city on the route, it was announced recently by airport officials. The traffic is not only that of business men flying to and from the Idaho capital, but also salesmen and others who cover the territory.

Since passenger service started in May, 165 passengers have left the Boise port, according to the report.

ART JOHNSON, assistant airway traffic supervisor for the U. S. Department of Commerce, recently signed the contract for the installation at Butte of a radio broadcasting station for use of airships flying the Government mail. On his return to Idaho Falls, Mr. Johnson received and signed the contract for the lease of a part of the Idaho Falls Country Club grounds for the erection of one of the radio stations. Mr. Johnson stated that the work on the station would be completed about October 1. Steel towers 300 feet in height will be erected. The station will be used for the guidance of planes.

COLORADO

Claims Altitude Parachute Jump Record

A NEW world's record of 28,000 feet for altitude parachute jumping was apparently established recently by Jimmie Donohue at the annual Pike's Peak Air Meet, Colorado Springs, Colo. The jump was made from a plane piloted by O. M. Mosier, president of Pike's Peak Air Commerce, Inc. Donohue required eighteen minutes to reach the ground in the 'chute and landed four miles distant from the municipal airport.

A sealed barograph installed in the plane from which the jump was made has been sent to Washington, D. C., for official calibration.

GLIDING has been adopted by the Highlander Boy Foundation as one of the special activities sponsored by the organization. Facilities for gliding as well as other clubs organized by the group will be established in the Temple of Youth, a building being constructed at Denver, Colo., by the Foundation.

THE Denver *Post* plans to stage soon its annual model airplane contest for boys under sixteen years of age. The contest is included in a program to promote interest in aviation development. Prizes for non-flying and for flying models will be awarded. The boy who enters the best non-flying model, as well as the boy who builds the best flying model, will receive a cash prize, a silver loving cup and a free flight in one of the large cabin planes of the Midcontinent Air Express or Western Air Express.

THE new municipal airport at Yampa, Colo., was dedicated Labor Day. The program of events included an air circus, followed by a dance in the evening. The airport was sponsored by local city officials and business men, and was built by the volunteer labor of Yampa citizens. The new field includes 400 acres of land on the top of a high, flat plateau two miles southwest of the town. The field is 500 feet above the town of Yampa and is free of obstructions.

Two runways, each 3,000 feet long and 200 feet wide, have been constructed.

THE first annual Colorado Goodwill Air Tour was to be held September 18-21, starting and ending at Denver, landing at the municipal field just before the Ford Reliability Tour arrived. The aviation committee of the Junior chamber of commerce, under the direction of William Ewing, was in charge of arrangements for the tour. The itinerary of the tour included important towns in Colorado: Colorado Springs, Pueblo, Salida, Saguache, Limon, Brush, Lamar and others.

FLYING the distance from the municipal airport, Colorado Springs, to the summit of Pike's Peak and return in seventeen minutes, twenty-seven seconds, O. M. "Red" Mosier, president of Pike's Peak Air Commerce, Inc., recently won a free-for-all airplane race over the top of the peak.

Mosier piloted a Lockheed Vega, powered with a Wasp engine of 420 horsepower. Contestants were required to climb more than 8,000 feet, as the altitude at the municipal field is about 6,000 feet, and the summit of the peak is more than 14,000 feet.

In the race for planes of 300 horsepower or under C. P. Kysor, flying a Cessna, was the winner. J. P. Story won the race for planes of lower power, flying a Ken Royce.

[I. R. ALEXANDER]

A FOURTEEN-PASSENGER trimotor monoplane of the Golden State Airways, Los Angeles, Calif., carrying a crew of five, landed at the Colorado Airways field recently for a three-day visit in Denver. The California group is making its second tour of the United States to study air conditions, possibilities of landing fields and other factors affecting air passenger traffic, with a view to establishing passenger lines. Capt. George E. Flaharty is in charge of the flight.

MORE than 4,000 persons attended the dedication of the Legion Airport, Brush, Colo., recently. The Brush Civic Club and other agencies have appropriated funds with which to develop the field. The field has a 5,000-foot runway. A hangar and other improvements will be provided in the near future.

PUEBLO fliers will affiliate with the Aeronautic Association of America.

THE Mid-Continent Air Express Corporation has requested the State Public Utilities Commission for a certificate of convenience and necessity to operate in Colorado. The company operates planes between Denver, Colorado Springs and Pueblo, and is seeking to extend its services to Trinidad, Colo. The application, signed by Phil Philbin, Jr., vice president of the company, asks permission to carry passengers, freight and mail in this State.

CARLOS L. REAVIS, widely known Denver pilot, was sworn in during the month as commanding officer of the 120th Observation Squadron, Forty-fifth Division Air Corps, Colorado National Guard, with the rank of major, to succeed Maj. Bruce Kistler, deceased.

UTAH

[G. PERRINS]

SALT LAKE CITY now has an overnight plane service to Seattle, Tacoma and Portland through the inauguration of a new all-plane service between Chicago and Seattle, via Salt Lake, by the Boeing System and the Varney Air Lines. This new service gives Salt Lake City added importance on the air transport map.

THE first Western aviation rodeo program at Salt Lake City was held Labor Day. Air races, stunts, 'chute jumps and other exhibitions were featurel. Over 30,000 spectators watched the aerial events.

TAKING messages from the ground without stopping the plane or even retarding the speed was the difficult procedure practiced by the Reserve officers of the 329th Observation Squadron of the 104th Division before the men returned to their homes following a two-weeks' period of training at the Salt Lake Airport. Training was done under the direction of Lieutenant Russell L. Maughan. The planes were brought from Crissy Field, San Francisco.

AIRPLANES are being used in the salmon industry. The fishermen locate from airplanes the herring schools on which the salmon feed. From aloft also they determine how the tidal currents set against fish traps and detect poaching operations, according to S. A. Stimpson, division traffic agent, Boeing Air Transport, Inc. The airplane is growing in popularity in the fishing industry in the Pacific Northwest.

TEN planes were at the Logan, Utah, Airport on Labor Day, participating in an air circus. Air races, stunts and exhibitions were featured.

TWO second-class glider pilot launchings were made at Salt Lake City recently at the University of Utah Glider Club meet. Theodore Marx, president of the club, and Frank Stafer both remained in the air over a minute to receive a second-class pilot's license.

AERONAUTICAL INDUSTRY

VON GRONAU'S TRANS-ATLANTIC FLIGHT

CAPTAIN Wolfgang von Gronau and a crew of three landed a Dornier Wal flying boat in New York harbor August 26, completing the first flight of a lighter-than-air craft from Germany to the United States. The flying time that had elapsed since Captain von Gronau and his aides left the Isle of Sylt in the North Sea on August 18, the northernmost German territory, was forty-seven hours. The route, by way of Iceland, Greenland and Canada, was 4,670 miles in length. Favorable weather conditions were encountered only on the last leg of the nine-day journey, which was made in seven hops.

The westward flight of the Dornier, across the Atlantic, was the fourth made from east to west by airplane. The former flights were made by the 'round-the-world army fliers, the German plane *Bremen*, with Baron von Huenefeld in command, and the *Southern Cross*, piloted by Wing Commander Charles S. Kingsford-Smith. Both of the latter made non-stop flights across the ocean. Captain von Gronau's ship carried the first air mail from Iceland and Greenland to Canada.

The route followed in the nine-day flight took von Gronau from the Isle of Sylt via the Faroe Islands to Reykjavik, Iceland. They left that city August 22 and landed the following day at Ivigut, Greenland. Pushing on immediately, they landed at Cartwright Bay in Canada that afternoon, left the following day and landed at Queensport Harbor August 24. They planned to fly on to New York the following day, but were forced to stop at Halifax when bad weather was encountered. The flight from Halifax to New York was made August 26.

Their Dornier Wal flying boat is seven years old and was used on Amundsen's Polar flight in 1925, and by Captain Courtney on an attempted trans-Atlantic flight by way of the Azores. The ship is powered with two 500-horsepower B. M. W.-6 engines, each driving a four-bladed propeller. An open-cockpit is provided for the pilot in addition to an enclosed cabin. The plane was originally designed as a passenger transport, but the seats in the cabin were removed to make room for additional fuel tanks.

In German aviation circles Captain von Gronau"s flight in a flying boat over the northern trans-Atlantic route is regarded as a practical contribution to commercial aviation. That the flying boat demonstrated itself as a practical vehicle for trans-Atlantic commercial flying is the consensus of opinion in Germany. The flight is a considered of importance in connection with the demonstration of the practicability of a northern air route for commercial aviation. Judging from the results of Von Gronau's flight it is believed that two trans-Atlantic aerial routes will be adopted, one via Iceland and Greenland and the other via the Azores and Bermuda.

Captain Von Gronau is director of Deutches Verkehrs Fliegerschule. He was accompanied by Edward Zimmer, co-pilot; Franz Hack, mechanic, and Fritz Albrecht, wireless operator.

Captain von Gronau and the crew trained for the trans-Atlantic journey by a preliminary three-day trip to Stockholm, Finland and other places in the Baltic. At the start of the flight the three members of the crew were unaware that an aerial journey to the North American Continent was under way and did not know until the first legs of the voyage were completed that other than a routine training flight, which the school sponsors every year as part of the regular course of instruction, was in progress. All three members of the crew are students at the flying school.

(*P&A Photo*)
German fliers at National Races (left to right) von Gronau, Albrecht, Hack, Miss Seelman, (secretary), and Zimmer

Facilities for repairing and refueling the plane were prepared in advance of their arrival and were available at the stopping points on the route. Navigation was accomplished by means of radio with which the plane was equipped, weather charts (Captain von Gronau said at the end of the flight that he was handicapped as the result of an insufficient number of these charts), a bubble sextant and four compasses. Three of these compasses were magnetic and one of the earth inductor type. Satisfactory results were obtained with this equipment.

Difficult conditions of weather, especially fog and rain, were encountered throughout the flight with the exception of the leg from Sylt to the Faroe Islands on which 700 miles were covered in six and one-half hours; and Halifax to New York, covered at a speed of more than 100 miles per hour.

Asked if the Arctic route offered possibilities for a commercial airline between the United States and Europe, Captain von Gronau said that such a development "calls for a broad organization." "It is a short route," he said, "but there are many details that would have to be planned for. Our flight was simply a training flight and our plane is an old one."

Captain von Gronau and his companions were extended official welcome by President Hoover and other Government officials of this country. During their stay they flew the trans-Atlantic plane to the National Air Races at Chicago, landing at the Great Lakes Naval Training Station. At a German-American banquet at New York City, September 4, they were guests with Dieudonne Coste and Maurice Bellonte, who completed the first Paris-New York flight shortly after the Germans had flown over the northern air route.

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The First International Air Congress

TWENTY-SIX resolutions were passed by the First International Air Congress, which closed at The Hague, Holland, September 7. It was decided to hold the next congress in 1934 and thereafter every three years. The congress recommended for special study during the intervening period, automatic pilotage and lighting of airports and air routes.

In the technical and scientific section the results of researches in duralumin were discussed. In the medical section several papers were read on the need for physicians who specialize in diseases of aviators to be pilots themselves.

In the juridicial section air law and its developments in several countries was considered and a resolution adopted called for the International Law Association to study the problem of international regulations. Unification of air law and codification was advocated.

ADOPT PRINCIPLES OF INTERNATIONAL AERIAL LAW

Aerial Legislation Discussed at Convention of International Law Association

PROPOSAL of principles governing international aerial law was adopted at the International Law Association, held at New York City, September 2-9. The discussion of the codification of these laws was shelved and the report of the codification committee was referred back to that body for further study and report at the next conference.

These principles, which are for the purpose of making the control and conduct of air traffic uniform all over the world, would afford a universal code for air navigation. The recommendations were advanced as proper supplements to the Convention for the Regulation of Aerial Navigation of 1919.

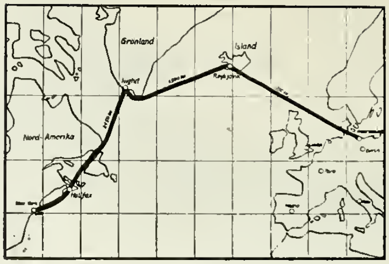
The aerial law principles are part of a program embodied in the report of a committee headed by H. F. Mainsty, K.C., of England. They provide rules for private aircraft trade, designed particularly to facilitate the operation of aircraft lines. Important among other recommendations, however, is an appeal for the international promotion of criminal laws to safeguard flying and penalize aerial threats to life and property.

The five principles recommended are as follows:

It is desirable that all the countries of the world should agree to an air navigation convention for the control and conduct of air traffic, and that all States should cooperate in bringing about such a comprehensive international agreement.

Each contracting party, when not a belligerent, should undertake to accord freedom of innocent passage above its territory to private aircraft of the other contracting parties, provided that the conditions laid down by the convention are complied with.

Aircraft operated by concerns authorized to run regular lines of transport should carry the special uniform marks provided for them in addition to the prescribed nationality and registration marks.



Map of von Gronau's Trans-Atlantic flight on northern route

An international regulation should be framed regarding the seizure, attachment or detention of aircraft and the prevention thereof by suitable guarantees on the lines of the regulations laid down on these subjects in maritime law.

Any person who willfully or negligently disturbs the safety of operation of air navigation by damaging, destroying or removing plant, means of conveyance or other objects which serve the purposes of aerial traffic, by the preparation of obstructions during the flight, by false marks or signals or in any such way and thereby occasions a danger for life and limb or the property of others, should be punished. The contracting parties should agree to undertake to promote corresponding criminal laws in so far as they do not already exist.

United States Represented at International Aviation Congress, Budapest

THE United States will be represented by an unofficial observer at the Ninth International Congress for the Juridicial Committee on International Aviation, according to a recent announcement of the Department of State. The conference will be held at Budapest, September 29-October 3. John J. Ide, Technical Assistant in Europe to the National Advisory Committee for Aeronautics, has been appointed American representative at this conference.

D. C. TO ESTABLISH AIRCRAFT ENGINE TEST STATIONS

IN order to expedite the engineering inspection and flight testing of civil aircraft as to airworthiness and eligibility for Federal license, the Aeronautics Branch of the Department of Commerce plans to establish a number of engineering test bases in different sections of the country, according to a recent announcement of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

The Aeronautics Branch will establish these test bases at New York, Detroit, Kansas City, Los Angeles, Oakland, Wichita, St. Louis and Cleveland. Effective October 1, the first four stations, which will be located at New York, Detroit, Kansas City and Los Angeles, will be equipped and ready to function. The remaining stations will be equipped as the necessity arises and appropriations become available. The four initial stations will be located at Roosevelt Field, L. I., N. Y.; Wayne County Airport, Wayne, Mich.; Fairfax Airport, Kansas City, Kansas, and Municipal Airport, Los Angeles, Calif.

The test bases are being established with the object of improving the service of the Aeronautics Branch, as well as the method of test work. The advantages of having definitely established stations where test work will be conducted, as cited by Col. Young, are numerous. A greater number of tests can be conducted in a given period on account of the fact that the Engineering Inspectors will be able to use advantageously the time which they now lose in traveling from one aircraft factory to another. Two or more Engineering Inspectors will be assigned to each base.

Each of the test stations will be equipped with scales for determining empty weight of the aircraft, ballast for loading a plane for flight test purposes and instruments for checking qualitative flight performance.

COSTE MAKING NATION-WIDE GOOD-WILL AIR TOUR

A GOOD-WILL air tour of the United States is being made by Major Dieudonne Coste and Lieutenant Maurice Bellonte in the *Question Mark,* the plane in which they recently completed the first Paris-New York flight. The tour is scheduled to be completed in twenty-eight days. The pilots will fly from coast to coast and from the Great Lakes to the Gulf of Mexico, covering a distance of 9,000 miles.

The flight is being made to promote international good will and to stimulate interest in commercial aviation among the general public throughout the country.

The itinerary of the flight, arranged to include as many cities as possible in response to the requests of municipal authorities through the United States is as follows:

SEPTEMBER

Monday, 15—New York to Boston, via Bridgeport, New Haven, Hartford, Providence and Newport.

Tuesday, 16—Boston to Cleveland, via Worcester, Springfield, Albany, Utica, Syracuse, Rochester, Buffalo and Erie.

Wednesday, 17—Cleveland to Indianapolis (lunch) via Akron, Columbus, Dayton, Richmond, Indianapolis-Detroit, via Fort Wayne and Toledo.

Thursday, 18—Detroit to Chicago, via Lansing, Joliet and Elgin.

Friday, 19—Chicago to Milwaukee (lunch)· Milwaukee to St. Paul-Minneapolis.

Saturday and Sunday, 20-21—Minneapolis.

Monday, 22—Minneapolis to Omaha (lunch), via Sioux City, Council Bluffs, Omaha, to Denver.

Tuesday, 23—Denver to Salt Lake, via Cheyenne.

Wednesday, 24—Salt Lake to Boise (lunch); Boise to Seattle.

Thursday, 25—Seattle to Portland, via Tacoma and Olympia.

Friday, 26—Portland to San Francisco, via Eugene.

Saturday, 27—San Francisco to Los Angeles.

Sunday and Monday, 28-29—Los Angeles.

Tuesday, 30—Los Angeles to Phoenix (lunch), via San Diego, Phoenix to El Paso.

OCTOBER

Wednesday, 1—El Paso to San Antonio.

Thursday, 2—San Antonio to Oklahoma City (lunch), via Austin, Waco, Fort Worth: Oklahoma City to Kansas City, via Wichita and Topeka.

Friday, 3—Kansas City to St. Louis, via St. Joseph and Jefferson City.

Saturday, 4—St. Louis to Memphis (lunch); Memphis to New Orleans, via Jackson and Baton Rouge.

Sunday, 5—New Orleans.

Monday, 6—New Orleans to Pensacola (lunch), via Mobile; Pensacola to Atlanta, via Montgomery.

Tuesday, 7—Atlanta.

Wednesday, 8—Atlanta to Winston-Salem (lunch), via Spartansburg; Winston-Salem to Richmond.

Thursday, 9—Richmond to Baltimore (lunch); Baltimore to Philadelphia, via Wilmington.

Friday, 10—Philadelphia to New York, via Trenton and Newark.

AIRCRAFT PRODUCTION DURING JULY

FIFTY-SIX aircraft manufacturers reporting to the Aeronautical Chamber of Commerce, produced 244 commercial and military airplanes during July, with a value, less engines, of $1,941,388.59, according to a report which was issued September 6 by the Chamber. Deliveries of commercial and military airplanes totaled 282 units with a value, less engines, of $2,258,965.59 in the same period. These totals for commercial and military production and deliveries are slightly under the total recorded for June. The decrease was confined largely to the production of military aircraft.

The production of 181 commercial airplanes in June with a value of $834,013.29, less engines, maintained the rate of production recorded in June, when 178 airplanes were reported manufactured. The value of the July output was approximately $350,000 less than that reported in June, although approximately the same number of units was produced both months. However, a larger proportion of the July output was in the open-cockpit biplane and monoplane class, with a corresponding decrease in the proportion of cabin monoplanes, seaplanes and amphibions.

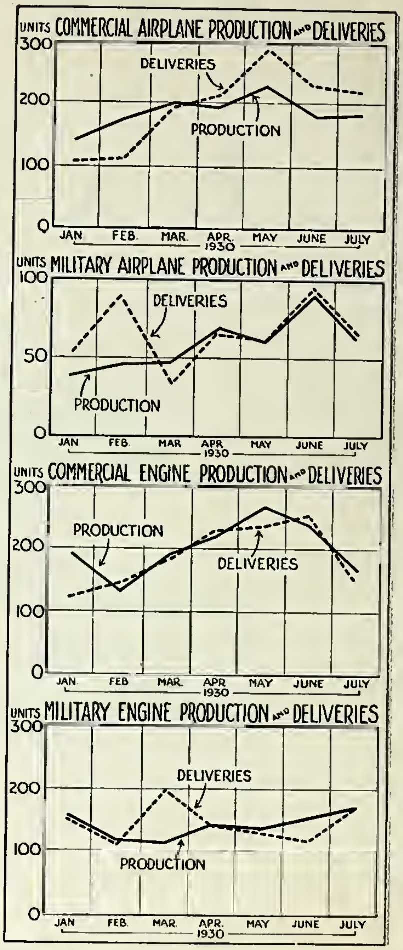
Deliveries of commercial airplanes in July were 4.5 per cent under the June level, with a total of 218, valued at $1,121,590.29. The relatively rapid decline from May to June in the number of deliveries made by manufacturers has been slowed up considerably, according to July reports.

Military production totaled sixty-three airplanes in July with a value, less engines, of $1,107,375.30. This is thirty-two per cent less than were produced in June, when ninety-three were reported. Deliveries of military planes closely parallels production with a total for July of sixty-four, having a value of $1,137,375.30, less engines. In June, ninety-four military airplanes were reported delivered.

Seventeen aircraft engine manufacturers reported the production of 334 commercial and military engines in July. The total value of these engines was $1,458,797. Deliveries of engines during July totaled 320, with a value of $1,374,304.75. Both production and deliveries in July were less than in June, the decline in commercial activity being offset to a small extent by an increase in military production.

A total of 166 commercial engines was produced in July, having a value of $543,134. This is about thirty-two per cent less than the 239 reported in June. Deliveries of commercial engines totaled 152 in July, with a value of $442,874.75. This is 41.4 per cent less than were delivered in June. Despite the drop in production and deliveries in July, the spread between the two was satisfactorily small.

Military engine production in July increased ten per cent over June, with a total of 168. The value of these engines was $915,663. Deliveries totaled 168 in July, with a value of $931,430.



Graph showing aircraft engine production and deliveries for first half of 1930

Speed Combined With Safety is Goal of S. A. E. Aeronautical Research

"SAFETY with speed" is the keynote of the aeronautical research work accomplished by the Society of Automovite Engineers, according to a statement recently issued by John A. C. Warner, general manager.

Believing that maneuverability, especially under conditions of bad visibility such as fog flying, is a prime requisite of modern air transport, the society has devoted particular attention to this problem. Due to the work that has been done by S. A. E. research committees and the designing engineers of the several airplane companies, safety in flying is becoming comparable with that of other forms of transportation, Mr. Warner said.

"Wing structures and control surfaces are constantly under observation," Mr. Warner said. "Our wind tunnels and our test machines are revealing much that make for safety in this part of the design. Stimulated by the Guggenheim Award, which the Society makes every alternate year, airplane companies are striving to better the performances of the Curtiss Tanager, which so efficiently performed last year."

The study of fuels has been carried out during the past year by the Society in cooperation with various oil companies and the Government agencies, including the Bureau of Standards, the Army and Navy, and the National Advisory Committee for Aeronautics. Vapor lock has been conquered, and the conditions under which vapor lock is likely to take place are now known so that pilots can avoid it. The Diesel engine and progress in other forms of power plant has been studied, and it is likely that before many months have passed there will be some changes in the power-producing unit as well.

New Airline Carries 1,557 aid Passengers in First Ten Days of Operation

THE New York, Philadelphia and Washington Airways, which opened an hourly service between these cities September 1, carried 1,557 paying passengers in the first ten days of operation, according to a recent report of officials of the company. Planes of the company during this period flew a total of 39,000 miles and completed ninety-five per cent. of scheduled flights.

P. O. Department Adopts Official Air Mail Flag

AN official air mail flag has been adopted, according to a recent announcement of the Post Office Department. The flag will be flown over all airports at which air mail planes stop, and above the airport building from which air mail is received and dispatched.

The background of the flag is white with red, white and blue stripes arranged similar to the face of an air mail envelope. Gold wings with a center globe on which the words "U. S. Air Mail" are inscribed, are sewn on the face of the flag. The wings are a replica of the insignia which was adopted by the Department last year as the official badge of air mail pilots.

The American Air Transport Association has been designated to distribute the flag, which will be made available at cost to 150 airports at which air mail planes land.

The flag was designed by Colonel L. H. Brittin, vice president and general manager of Northwest Airways.

Air Commerce Violations

SIXTY-TWO violations of the Air Commerce Regulations during the last two months in the Northeast district, comprising New York, New Jersey and New England, have resulted in suspensions of seventeen pilots for periods ranging from two weeks to three months. This information was made public by Joseph S. Marriott, chief of the inspectors' service, at a meeting of inspectors of the Department of Commerce, Roosevelt Field, L. I., September 15.

The meeting was the first of a program of meetings of inspectors to be held throughout the country in the interest of uniform law enforcement and to better coordinate the work of the various districts. Another meeting will be held in the winter.

BROADCASTING FROM AN AIRPLANE

By POWEL CROSLEY, JR.

THE feasibility of broadcasting from a speeding airplane flying nearly 200 miles per hour, was demonstrated with great success during the recent National Air Races held in Chicago, and the Nation Air Reliability Tour, September 11-27.

The flying radio station KHILO, owned by the Crosley Radio Corporation, broadcast daily while flying over the Curtiss Airport in Chicago. An announcer at the microphone in the plane described the races. His voice was picked up by a land station and rebroadcast over a nation-wide network. The experiment was repeated at Cleveland on Labor Day during the International Balloon Races.

The Crosley plane was designated the official radio ship for the National Air Tour, on which daily broadcasts were made while flying over many of the cities included in the itinerary. The plane was piloted by Captain William S. Brock.

The radio plane is equipped with a 150-watt radio phone transmitter and an aircraft receiver capable of receiving medium power messages for a distance of approximately 1,000 miles. Under ordinary weather conditions the pilot is able to talk to listeners over 300 miles away, although reception at this distance is not sufficiently good for rebroadcasting.

The Crosley corporation will use this plane as a flying laboratory for the development of radio for us in aviation. The time is coming when every airplane in commercial service will be required to have radio sending and receiving equipment, which is indispensable for obtaining weather reports and other information so necessary for the safety of pilots and passengers.

Broadcasting airplanes make it possible to render a great public service by reporting events to millions of radio listeners as the plane flies over the scene of action and eye-witnesses describe what they see. This will, of course, in no way supplant the present methods of gathering and presenting news, but will enlarge the facilities now used for this purpose.

Powel Crosley, Jr.

Hawks Sets New York-Detroit Record

CAPTAIN FRANK HAWKS arrived at Ford Airport, Detroit, Mich., September 9, establishing a new record for a New York-Detroit non-stop flight. His elapsed time of three hours three minutes bettered the previous record of four hours fifteen minutes established two years ago by Colonel Charles A. Lindbergh.

Captain Hawks flew the Travel Air Mystery S, used recently in record trans-continental flights.

Sets Junior Coast-to-Coast Records

TWO new junior transcontinental flying records were established recently by Eddie Schneider, eighteen-year-old airplane pilot of Jersey City, N. J. Schneider landed at Roosevelt Field, L. I., August 24, establishing a new West-East junior coast-to-coast record of twenty-seven hours and nineteen minutes. The previous week Schneider set an East-West junior trans-continental record of twenty-nine hours and fifty-five minutes.

CONTROL OF HANGAR FIRES STUDIED

THE report of the Fact-Finding Committee on Control of Airplane Hangar fires by Automatic Application of Water, organized by the Aeronautics Branch of the Department of Commerce for the purpose of determining the practicability of using automatic sprinkler systems to control fires in airplane hangars, was issued recently by the Aeronautics Branch.

Consideration of the different sources or locations of ignition of fires in hangars determined that the test program should include:

Fire from a source exterior to the airplane causing ignition of a wing tip;

Fire starting along and within the wing from a short-circuit of the wiring system;

Fire starting in leaking gasoline within the fuselage; and

Fire starting in gasoline spilled on the floor and covering a large area.

Although the start of fire is most uncertain and the variations are almost infinite, it was thought that the divisions as given would represent the more usual conditions. The comparison of the different sprinkler systems involved the repetition of the fires with all conditions duplicated.

The results of the tests and the observations with respect to the conditions surrounding them lead to the following conclusions as to the effectiveness of the automatic application of water by sprinklers in controlling airplane hangar fires:

Slow burning fires in well ventilated buildings with high ceilings may continue without opening automatic sprinklers.

Extremely fast fires in single planes may burn themselves out without opening automatic sprinklers.

Fires in readily ignitable and highly combustible materials spread over wide areas, such as gasoline on the floor or highly flammable wing surfaces, may proceed at first faster than the opening of sprinklers and thus outrun for a time the application of water to the fire.

Water from overhead sprinklers may on some occasions keep the top surfaces of an airplane wetted, thus preserving a shelter under which a fire may spread to various parts of the machine.

The automatic application of water by sprinklers will generally give good protection to airplane hangars and contents except such of the contents as are involved in the outbreak of fire.

The advantages of a heat-actuated system of open sprinklers such as the one tested are apparent (a) in small or slowly spreading fires, (b) in buildings having high ceilings or conditions of ventilation causing horizontal drafts, or (c) in those fires where the time required for the opening of the automatic sprinklers permits the fire to burn out or to get beyond the range of discharging sprinklers.

These tests have indicated that sprinkler systems installed and maintained in accordance with recognized good practice for the protection of this class of property and having an adequate water supply can control most of the fires likely to occur in airplane hangars; therefore serious thought, should be given to the subject of such installation.

VAN ORMAN WINS BENNETT RACE

THE United States has won a second leg on the third Gordon Bennett cup, according to the official results of the International Gordon Bennett Balloon Race recently announced by the National Aeronautic Association.

Ward T. Van Orman, piloting the balloon *Goodyear III,* and representing the United States, was declared the winner of the race, which started at Cleveland, Ohio, September 1. Van Orman landed in Norfolk County, Mass., a distance of 542 miles. He was accompanied by Alan MacCracken, aide. First place in this event carries a prize of $1,000. Van Orman was the winner of the Bennett race last year, his performance this year being his second victory for the United States.

The official standing of the competitors, determined after scaling of the distances by the Geological Survey and calibration of the baragraphs by the Bureau of Standards, was announced as follows:

1. United States—Ward T. Van Orman, Alan MacCracken, Canton, Mass., 542 miles.
2. Belgium—E. Demuyter, L. Coeckelberg, Adams, Mass., 448 miles.
3. United States—Edward J. Hill, Arthur J. Schlosser, Albany, County, N. Y., 417 miles.
4. United States—R. J. Blair, F. A. Trotter, Copenhagen, N. Y., 348 miles.
5. Germany—Dr. Hugo Kaulen, Carl Gotz, New Lisbon, N. Y., 343 miles.
6. France—Albert Boitard, Jean Herbe, Smithville, Ont., 165 Miles.

CLEVELAND GLIDER CONTEST RESULTS

RESULTS of the glider contests held at Cleveland, Ohio, August 31-September 1, in conjunction with the Gordon Bennett Balloon Race and Aerial Carnival, were announced recently by officials of the National Glider Association. Louis Ross, president of the Cleveland Glider Association, was in charge of the contests.

The results were reported as follows:

Event 1. One day only. PTGS only. Novices and third-class pilots only. Shock-card, maximum crew ten. Smoothest landing on level ground after ten seconds. First place: McCance of Border Cities Glider Club, Windsor, Ont., flying Detroit Gull. Second place: Gauldin of Cleveland Institute of Aviation, Cleveland, flying Alfaro PTG. Third place: McDonald, University of Detroit, flying PTG of university construction.

Event 2. One day only. PTGs and STGs. Third and second-class pilots. Smoothest landing after 10 seconds for PTGs and 15 seconds for STGs. First place: Bodenlos, Akron Glider Club, Cadet II. Second place: Coles, Hamilton, Ont., Glider Club, Detroit Gull. Third place: Gauldin, Cleveland Institute of Aviation, Alfaro PTG.

Event 3. One day only. STGs and Soarers only. Auto-towing, landing on a mark. Maximum rope or cable 600 feet. Handicaps: Third-class pilots, none; second-class and non-commercial, 60 seconds duration. First class and commercial, 90 seconds duration. First place: O'Meara, Baker-McMillen Co., Cadet II, Akron, Ohio. Second place: Wally Franklin, Franklin Glider Corp., Franklin STG, Ypsilanti, Mich. Third place; Tie: Nass, Franklin Glider Corp., Franklin STG, Alfaro, Alfaro STG. Cleveland.

Event 4. Same as number 2. First place: Steele, Border Cities, Detroit Gull. Second place: N. H. Walker, Baker-McMillen Co., Cadet II. Third place: Miss Freda Jacobs, Goodrich Girls Glider Club, Akron, Ohio.

Eevnt 5. Same as No. 3. First place: Wally Franklin, Franklin STG. Second place: Taylor, Akron Glider Club, Cadet II. Third place: Kastyov, Goodrich Glider Club (Men), Akron, Ohio, Cadet II.

Event 6. Best decorations and uniforms, both days, for clubs. First place: Goodrich Girls Glider Club, Cadet II. Second place: East End Exchange Club, Cleveland, Waco PTG. Third place: Cleveland Institute of Aviation, Alfaro

Event 7. Efficiency, both days for clubs. First place: University of Detroit Glider Club, U. of D. PTG. Second place: Fisher Y Glider Club, Detroit, Detroit Gull. Third place: East End Exchange Club, Cleveland, Waco PTG.

COMING AERONAUTICAL EVENTS

September 15-October 10. Good Will Aerial Tour of the United States by Major Dieudonné Coste and Maurice Bellonte in the trans-Atlantic plane *Question Mark.*

September 24-October 5. National Soaring Contest, auspices National Glider Association, Elmira, N. Y.

September 29-October 3. Ninth International Congress of the Juridical Committee on International Aviation, Budapest.

October 15. Start of National Air Tour, Washington, D. C., sponsored by Oklahoma State Chamber of Commerce and United States Department of Commerce.

October 17-20. Dedication of Municipal Airport, Denver, Colo.

November 6-7. Regional Conference on Traffic Problems and Aviation Progress, for Southwestern States, auspices U. S. Chamber of Commerce, Dallas, Texas.

November 28-December 14. International Aero Show, Grand Palais, Paris, France, auspices of Chambre Syndicale des Industries Aéronautiques.

December 5-6. Open Meeting of Western States Aeronautical Association, Portland, Ore.

December 10-23. Intrenational Congress of Aerial Security, Paris, France.

February 1-20, 1931. First Pan American Aeronautical Conference. Montevideo, Uruguay.

May 15-31, 1931. International Aero Exhibition, Stockholm, Sweden.

SOARING CONTEST HELD AT ELMIRA

THE National Soaring Contest is being held at Elmira, N. Y., September 21—October 5. Prizes totaling $1,000 have been donated by the Wright Aeronautical Corporation for award to the winners of the various events. In addition to this sum it is planned to award an additional $800 in prizes. The terrain at Elmira was selected by the Technical Committee of the National Glider Association, sponsor of the contest. Only American citizens will be eligible for the prize money.

The prizes offered by the Wright corporation are for events 1-3 as follows: longest distance, straight line: first, $200, second, $150, third, $50; duration, the same amounts respectively will be awarded the winners of this event; and shuttle distance, first, $100, second, $75, and third, $25. For the first time the Edward S. Evans Trophy for Duration will be offered.

Other events are scheduled as follows:

Event 4, Altitude; Event 5, Landing on a mark, shock-cord; Event 6, Landing on a mark.

For the first time a contest will be held intended for the encouragement of soaring flight only. Events 5 and 6 are provided for entertainment on any days when soaring flight would be impossible due to a dead calm. The ridges and hills face all directions so that any direction wind can be utilized for soaring.

AIR CONFERENCE AT WASHINGTON, D. C.

A CONFERENCE of aircraft manufacturers, aircraft owners and operators was scheduled to be held in the conference room of the Department of Commerce building, Washington, September 25-26, to consider proposed amendments to the Air Commerce Regulations and Airworthiness Requirements, according to an announcement made September 11 by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

The Airworthiness Requirements of the Air Commerce Regulations constitute a set of rules embodying requirements for structurally airworthy aircraft which serve as a guide to the aircraft industry as to what will be required on new designs, Col. Young said. Since the last revision of these requirements, however, many developments, mostly minor in character, have been brought about.

Brunner-Winkle Reorganized

REORGANIZATION of the Brunner-Winkle Aircraft Corporation, and the change in corporate name to the Bird Aircraft Corporation, was announced recently by officials of the corporation. The new directorate announced is as follows: Col. Henry Breckenridge, Major Thomas G. Lanphier, Harry Mesinger, William E. Winkle, Frank W. Brooks, Jr., Detroit; S. R. Livingstone, Detroit; Howard Bonbright, Detroit; Frederick C. Ford, Detroit, and W. W. Mills.

The new board of directors announced the election of the following officers: Major Thomas G. Lanphier, president; William E. Winkle, vice president and general manager; and James Phelan, secretary and treasurer.

NEW YORK

ABOUT 70,000 yards of new asphalt runways, taxiways and aprons are being laid at Roosevelt Field, and a concrete apron is being extended 150 feet by a Colas pavement. Colas is a solution of asphalt in water adapted to airport surfacing. This substance is being used on the new 2,200-foot runway which will extend from the southwest corner of the field to a point between the old and new hangars on unit No. 2. The taxiways will run from the apron to this new runway.

THE Curtiss Condor, eighteen passenger transport, will retain maneuverability after one of its two engines has been cut immediately after the take-off, according to the results of tests recently completed by the engineering division of the Curtiss-Wright Corporation. The tests were conducted by Captain Frank T. Courtney, test pilot for the corporation.

COMPLETION of the Aeronautical-engine Research Laboratory in the Daniel Guggenheim School of Aeronautics was announced recently by Professor Alexander Klemin, head of the school. The laboratory is equipped to test any type of air or water-cooled airplane engine up to 300 horsepower. Use of the laboratory by students was started at the opening of the fall semester in September.

COMPLETE sets of twenty pictures of the commercial and military planes made by the Curtiss-Wright Corporation are available at a cost of twenty-five cents a set.

For those interested in model building, three scale drawings of the Falcon, Hawk and Fledgling military type planes are included in the set. These sets may be ordered from the Curtiss-Wright Corporation, 27 West 57th Street, New York City.

(*Continued on next page*)

(*New York News continued*)

THE number of paid passengers of Curtiss-Wright Flying Service for the first six months of 1930 was ninety-six per cent of the total for 1929, according to a recent announcement of officers of the Curtiss-Wright Corporation. The Curtiss-Wright Flying Service carried 83,268 paid passengers during this period, as compared to 86,589 during the entire year of 1929.

THE Russell Lobe Parachute has been awarded Approved Type Certificate No. 1 by the United States Department of Commerce. This is the first approved type certificate ever to be awarded an American parachute by the United States Government.

EDWARD F. THOMAS, formerly general manager of Thomas Aeronautical Bureau, Aviation Advertising Counsel, West Virginia, has discontinued the bureau and is now general manager of the American Aviation School, New York City.

The American Aviation School, established in December, 1929, gives aviation ground school and engineering instruction. Application has been made for Department of Commerce rating.

APPOINTMENT of R. Stuart Murray as an associate on the staff of the New York firm of Black and Bigelow, Inc., aeronautical engineers for the Armstrong seadrome and airport designers, was recently announced. Mr. Murray will act in an advisory capacity to and for Black and Bigelow in connection with South American aeronautical projects and activities.

VICTOR VERNON, general manager of Colonial Airways, has announced the resignation of B. A. Pollett, general traffic manager, effective October 1. Goodrich E. Murphy, district manager of Boston, will be transferred to New York to succeed Mr. Pollett. Ralph S. Maughm, formerly of the New York office, will be transferred to the Boston office.

TWO trimotor twelve-passenger Fokkers were added recently to the air passenger line of Eastern Air Transport, Inc., in the service between New York and Richmond, according to an announcement of Ralph S. Wosting, business manager.

The Fokkers will be supplemented in the Richmond service, which also reaches Philadelphia, Baltimore and Washington, by one of the ten-passenger Ford trimotors with which the company opened the line.

A BRANCH of the Detroit Aircraft Export Corporation, New York, has been established at Mexico City, Mexico, according to a recent announcement of I. J. Miranda, vice president. The office will contain a showroom where Detroit aircraft will be exhibited. In addition, hangars have been obtained at the new Civil Airport where the division will have available for demonstration a Lockheed Sirius, Lockheed Vega, a Ryan and a Parks. The Mexican office will be under the supervision of Manuel R. Varela, transport pilot.

A PLANE operated by Colonial Airways, Inc., on the New York-Boston Airline, made the journey from Boston to New York recently in one hour and twenty-five minutes. The schedule of time is one hour and forty-five minutes. This is the record time of the company on this journey. New Pullman Coach Busses, with reduced running time from Newark Airport of thirty-five minutes, landed passengers at Hotel Pennsylvania in two hours from the time they left Boston Airport.

The Ford trimotor making the trip had been re-conditioned at the factory with the new engine mounts installed which increased the speed of the plane nine or ten miles per hour, according to an announcement of Victor Vernon, division manager.

THE Barren Island Flying Club recently took delivery of a new Barling low-wing monoplane, to be used for student instruction at the Barren Island Airport, Brooklyn. Enrollment in the club is limited to thirty members, each member being a part owner in the club's plane. Full coverage insurance for both club members and the plane has been obtained. Adam Gorman is manager of the club.

CENTRAL NEW YORK

[M. MARVIN]

LIEUT. H. O. NEVIN recently purchased a Link aviation trainer, and is demonstrating it at the Amboy Municipal Airport. This machine is a miniature airplane which does everything but leave the base to which it is attached. It has proved an efficient trainer as it is operated by means of controls similar to those of an airplane. It climbs, dives, banks and turns in response to the slightest movement of the stick or rudder. A clock-like instrument attached to the trainer records the mistakes the operator makes during the course of a lesson. Lieut. Nevin plans to take the trainer to many airports in New York State for demonstration.

H. B. CROUSE, president of the Crouse Hinds Company, of Syracuse, recently announced that an order has been awarded the Crouse-Hinds Company by the Government for 150 thirty-six inch beacon lights. A year will be required for the production of the beacons. When they are completed, 120 of the lights will be erected by the Airways Division of the Department of Commerce on the 1,500-mile airway route between San Diego and Fort Worth, Texas. The units were designed by Capt. F. C. Hinsburg, chief engineer of the U. S. Airways Division.

WOLFRAM HIRTH, German glidist, is spending some time at Amboy. He plans to tour the United States demonstrating his German sailplane. This craft has a wing span of fifty feet and weighs 300 pounds. On flat ground without any lifting upwind, he is able to rise to eighty feet and execute a long glide.

An airplane radio school has been established at the Empire Air Transport, Inc., field at Amboy. Twelve students have enrolled in the school. Broadcasting and receiving equipment has been installed and the planes of the Empire company have been equipped with radio. A Government licensed radio broadcasting station was recently established at the field.

NEW ENGLAND

Tercentenary Air Meet Held at the Boston Municipal Airport

THE Tercentenary Air Meet was held at the Boston Municipal Airport September 5-7. Of the twenty-six events listed in the official program, all except three were carried out on schedule and without a single accident during the three-day meet. More than 100,000 spectators attended the air show, and more than 1,400 of these were passengers on sightseeing flights during the period of the races. On September 6-7 there were 506 sightseeing flights completed. Approximately 2,000 take-offs and landings were made in the course of these flights.

The meet opened September 5 with the take-off of the regular New York bound trimotor Ford of Colonial Air Transport accompanied by two other ships from the airport on a formation flight over Boston. This flight was followed by a nine-ship formation comprised of three planes each from the Curtiss-Wright Flying Service, East Coast Aircraft Corporation and Skyways.

An altitude race to a height of 5,000 feet with five planes competing was won by Joseph Barber, flying a 300-horsepower Cessna, in four minutes and four seconds. A dead stick landing contest was won by Crocker Snow in a Stearman.

The program on September 6 consisted of military events and passenger flights. Included in the events held on this day was a National Guard Race of forty miles, won by Capt. Stanley E. Beck in twelve minutes and thirty-nine and one-fifth seconds. He flew a Curtiss Falcon. A three-lap speed race of thirty miles, staged by the Army Air Corps, was won by First Lieut. M. Hollidge, with a time of ten minutes.

A night attack and defense of the airport was staged by 101st Observation Squadron and the 211th Antiaircraft Regiment.

Demonstrations made by the National Guard Air Service included acrobatics and combat work, parachute jumping and communication between planes in the air and ground crews.

A five-lap fifty-mile speed race open to civilians was held September 7. Louis D. Parker, flying a Stearman, placed first with a time of eleven minutes and fifteen and four-tenth seconds. A demonstration of acrobatic flying was given by James Haizlip in the Shell Mystery S Travel Air. A dead stick landing contest in which six contestants were entered, was won by Charles Emerson in a Kittyhawk. He came within thirty-five feet two inches of the mark. A balloon bursting contest in which seven planes entered was included in the events.

(*Continued on next page*)

(New England News continued)

THE seaplane ramp located at the U. S. Naval Reserve Air Station at Squantum, Mass., is available for use, according to a recent announcement of R. C. Needham, Commander, U. S. Navy, Acting Hydrographer.

NEW JERSEY

DWIGHT MORROW, United States Ambassador to Mexico, has accepted the post of Governor of the National Aeronautic Association for New Jersey. In 1925, at President Coolidge's invitation, Mr. Morrow served as Chairman on the President's Aircraft Board. This board was instrumental in bringing about the Air Commerce Act of 1926 and the Five-Year Army and Navy Aircraft Programs.

SEVEN and one-half tons of circulars were dropped by Fred Trautwein from his Whirlwind-powered New Standard on a recent tour of 220 cities in New Jersey, New York, Pennsylvania, Vermont and Connecticut, for the Grand Union Stores. The circulars totalled about 2,000,000. In the course of the trip Trautwein carried 476 passengers as guests of the company.

Although the route of the tour was over the Allegheny Mountains, and the loads at times exceeded 1,000 pounds in addition to mechanic, assistant, pilot, baggage and full gasoline tanks, Trautwein reported no difficulty in flying his ship from small, rough fields and covering the route. The company is planning a similar tour within a few weeks, according to Trautwein.

THE Eastern base of operations of National Air Transport has been transferred from Hadley Field, New Brunswick, N. J., to Newark Municipal Airport. The change of bases has eliminated more than one hour from the time required for air mail and air express to reach New York from Chicago, the Pacific coast and other sections of the United States, according to N. A. T. officials.

The Newark airport is equipped with night flying facilities and is sutiable for both day and night air mail operations. National Air Transport has started construction at the field of a hangar with space for fifteen planes, in addition to shops, offices and radio laboratory.

AN air carnival was held September 21 in conjunction with the Pavonia Tercentenary commemorating the 300th anniversary of the founding of Jersey City. Col. Clarence Chamberlin directed the aerial events.

PROTEST of the ruling of the New Jersey State Board of Commerce and Navigation barring seaplanes, flying boats and amphibions from all inland water of the State reported with the board was filed September 16 by the Aeronautical Chamber of Commerce. The ruling followed the application of Frank A. Morgan for permission to operate a five-passenger flying boat between Nolan's Point and New York City.

AN airway sign identifying the town of Teaneck, N. J., has been erected on the roof of the Teaneck Coal and Lumber Company. In addition to the name of the town the sign contains two arrows, one pointing toward the Teterboro Airport, Hasbrouck Heights, and the other pointing north. The letters on the sign are twenty feet in height. The sign is illuminated by twenty-four 200-watt reflector lights and is visible by night at a height of several thousand feet. Similar signs erected in New Jersey identify the following towns from the air: Hackensack, Passaic, Paterson, Westwood, Ridgefield, Rutherford, Allendale, Lodi and Woodridge.

[F. L. FITZPATRICK]

BUSINESS is good, according to Jack Bartow, manager of the Camden office of Wings Corporation, located at Central Airport. He recently reported that his company has sold eleven model F Waco planes since the air show held in Camden Convention Hall last April. The first F seen in Camden was an exhibit at the show. Two of the planes were bought by the Schuylkill Airways of Pottsville, Pa., and two were purchased for use by the Camden personnel of Wings Corporation.

ON SEPTEMBER 2, Wings Corporation, Camden, discontinued service on the Camden-Stroudsburg line which operated daily during the summer. However, it was announced, the line will operate on charter, providing a full payload is secured.

PILOTS on the New York-Philadelphia-Washington airline which began every hour on the hour service September 1, will have their headquarters at Washington and Newark Airports. At the Newark field are: Harry McGee, former chief test pilot of the Ford Company, aviation division, and former chief test pilot of the Eastern division of TAT-Maddux; Clarence Bragunier, formerly of Curtiss-Wright Flying Service, California; Lloyd Juelson, formerly of Universal Air Lines; W. Wipprecht, Jr., formerly of Pan American and Colonial; C. E. Steel, formerly of Universal Air Lines, and New York, Rio and Buenos Aires; and Fred Davis, formerly of TAT-Maddux.

PENNSYLVANIA

LANCASTER--Bethlehem Airways, Inc., Lancaster, Pa., will represent the American Eagle Aircraft Corporation, Kansas City, Kansas, in Pennsylvania. The company recently signed a contract to purchase thirty-five American Eaglets, powered with the Szekely thirty-horsepower engine.

AFTER its first successful flight at Wilkinsburg Airport, the Westinghouse Club glider *Electron* was christened by Thomas Spooner, president of the Westinghouse Club and Assistant Director of Research for the Westinghouse Electric and Manufacturing Company. Captain Donald F. Burr piloted the craft on its initial flight. Captain Burr, a former member of the Royal Canadian Flying Corps, is coach of the glider club. The craft, an all-steel primary type Evans, was received unassembled, and built by members of the club. The club has a membership of nearly 100, many of whom are executives of the plant.

[B. F. PRYOR]

AFTER a delay of several months, caused by a legal entanglement over a small part of the 180 acres of land comprising the new Scranton Airport, work has been started and is progressing rapidly. It is expected that the new airport which is located at Schultzville, a few miles from the city on the Roosevelt Highway, will be completed before the summer of 1931. The Austin Company of Cleveland, Ohio, was awarded the contract on the airport, which will cost one-quarter of a million dollars to complete.

GLIDING is rapidly gaining in popularity here, there being one or more gliders in operation at most of the airports in Northeastern Pennsylvania.

At the Wyoming Valley Airport, Frank Martz, Jr., owns and flies a Waco glider and plans to organize a glider club. At the Schultzville Airport, L. L. McInroy has been flying an Alexander Glider. This port is the headquarters of the Scranton and Abington Glider Club, which recently received a charter from the National Glider Association. This club has a full quota of thirty members. W. Wayne Thomas is president and George Lohman, secretary-treasurer.

At Lake Winola the first gliding school operated in this section of the State has been organized. Since the opening of the school the roster of pupils has been filled to capacity. Herr Martin Schemff, German glidist, is instructor.

The Phalanx Glider Club was recently formed at Carbondale. Herbert Johnston, head of the club, was recently presented with an Alexander Glider by James Paul, banker and civic leader.

THE Frank Martz Flying Service, operating from the Wyoming Valley Airport, on August 1 increased the passenger service between Wyoming, Pa., and New York City. The company, which formerly made but one trip to New York and return daily, is now making two trips daily. The following schedule has been maintained without interruption: leave Wyoming Airport at 10 a. m., arrive Newark Airport at 11 a. m. with ten-minute stop-over at Stroudsburg, Pa., en route; and leave Newark Airport at 11:30 a. m., arrive Wyoming 12:30 with stop-over at Stroudsburg. Plane leaving Wyoming at 4 p. m. arrives at Newark field at 5 p. m. with ten-minute stop at Stroudsburg. Leaving Newark at 5:30 p. m., this plane arrives at Wyoming at 6:30 p. m., with a stop-over at Stroudsburg. The fare is ten dollars one way and twenty dollars round trip. Transportation between the Newark field and New York City on both trips is by means of buses operated by the Frank Martz Bus Co., of which the airline

(Continued on next page)

(*Pennsylvania News continued*)
is a subsidiary. Bellanca six-passenger planes are used.

PHILADELPHIA
[R. Gard]

The American Legion Air Meet

A TWO-DAY air meet was held September 6-7 at the Philadelphia Airport under the auspices of the George H. Imhof Post of the American Legion.

Tony Little, Philadelphia pilot who won second place in the Men's Atlantic Derby of the National Air Races, captured first place in the race for planes under 550-cubic-inch displacement on the first day of the meet.

Miss Ruth Webb won a race open only to women pilots. She flew a Kinner-powered Fleet.

A race, open to planes of under 1,000-cubic-inch displacement, was won by George Zinn, flying a Taperwing Waco. Second place went to Tony Little in his Monosport, with Cav Newlin coming in third with a Travel Air.

The principal event of the first day, a free-for-all race, was won by Mrs. Opal Kunz, flying a Travel Air.

On the second day of the races, George Zinn, flying his Taperwing Waco, won the race for planes of the 1,000-cubic-inch class. Tony Little was second, and J. C. Newlin was third. In another race, for engines of 550-cubic-inch displacement, Little came in first with Newlin a close second.

An unannounced feature of the meet was provided when a Burnelli twenty-four passenger transport plane, piloted by Lou Reichers of New York arrived from Pittsburgh.

Captain Dieudonne Coste and Maurice Bellonte paid a visit to the air meet, flying low and circling the field a few times in the *Question Mark*.

George Zinn of Rydal and J. Shelley Charles of Richmond, Va., gave exhibitions of acrobatic flying both days of the meet. Zinn captured the event on the second day, with Charles a close second.

The Pitcairn Cierva Autogiro was demonstrated each day by Jim Ray of the Pitcairn organization. Ray clearly showed the practicability of the machine and gave the spectators an idea of its future possibilities.

Jack Bartow and Bat Taylor, of the Wings Corporation, gave daily demonstration flights in a Waco glider towed by an automobile.

Formation flights were made by members of the National Guard, Naval Reserve units, and civilian ships. A group of Navy ships from Valley Stream, N. Y. also participated in exhibition flying.

Proposed Hog Island Seaplane Base

PLANS have been prepared for a seaplane base at the Hog Island airport site by Lieut.-Comdr. Robert S. Hedtler.

The plans show a seaplane basin approximately 800 by 1,200 feet in water surface. Seaplanes will land in the Delaware River and then taxi into the basin, which will be open to the river on its southern side.

The other three sides the seaplane basin will be bordered by a continuous concrete ramp, with a one-in-seven slope.

The ramp will be 240 feet in width. On the landward side, it will be 1,100 feet long east of the basin, 1,400 feet long north of the basin, and 1,200 feet long west of the basin.

Behind the ramp will stretch a broad, level expanse of concrete, 300 feet in width.

A concrete road, running north by west, will connect the apron with the landing field for landplanes. By using this roadway, amphibions can taxi to the landing field for landplanes and take off from there instead of going out through the basin into the river.

Three electric winches will be installed at various vantage points along the ramp to haul seaplanes from the water. Auxiliary handling trucks will also be provided.

Commander Hedtler has recommended that five hangars be provided for seaplanes, these hangars to be built east of the eastern ramp and apron. The largest will measure 120 feet by 175 feet. Four others are to be 100 by 120 feet in size. All will have a height of thirty-five feet.

The site of the seaplane base is at the up-river corner of the Hog Island airport. It will be reached by an extension of a road down to the river.

A boathouse will be provided at the southwest corner of the base and will be large enough to accommodate two forty-foot speedboats to be available for rescue work.

Space north and west of the base will be assigned as industrial sites. The city has started negotiations with various aviation concerns desiring to establish seaplane factories on the site.

DAILY service between Central Airport and Atlantic City, recently inaugurated by the Ludington Flying Service, is to continue throughout the winter, according to officials of the company. Because of the unusual demand for the service, a schedule of five planes per day was in effect during the summer months.

MARYLAND
[E. W. Walsh]

IN ORDER to install additional equipment designed to increase its speed, the XFJ-1, experimental fighting plane developed for the United States Navy by the B/J Aircraft Corporation, formerly the Berliner-Joyce Aircraft Corporation, of Baltimore, Md., has been returned to the Baltimore plant. It had been undergoing extensive tests at Anacostia, D. C.

Flotation gear, a Townend ring and Air Wheels are to be installed, the Air Wheels taking the place of the original wheel installation. The flotation gear, designed for emergency use only, will consist of rubber bags placed inside the wings. These bags can be inflated rapidly in case of a forced landing on the water by releasing compressed gas from a small bottle carried in the cockpit of the plane.

By the installation of the Townend ring it is expected that from ten to twelve miles per hour will be added to the speed of the plane.

OHIO

A LAW requiring the air-marking of municipalities is now in effect in Ohio, according to a recent announcement of John M. Vorys, State Director of Aeronautics. The law provides that within sixty days after receiving notification, a municipality must place a sign bearing its name on the roof of some building which meets the specifications of the Director of Aeronautics. Meridian indicators and an arrow pointing to the nearest airport must be provided. This material is to be supplied at the expense of the municipality.

AN APPARATUS which determines the speed of the physical blow struck against a tire, comparable to the landing speed of an airplane, has been developed by the B. F. Goodrich Rubber Company of Akron, Ohio. The apparatus was designed to overcome the difficulties in laboratory testing of airplane tires to determine their strength under heavy loads, hard landings and irregular runways.

The machine consists of a vertical guide track 100 feet high, down which a known weight is dropped onto a mounted and inflated tire. Exact speed of the weight in dropping from an established height is recorded on a rotating cylinder operated by a synchronous motor. The slope of a line made on the graph by an indicator attached to the weight carriage is used to calculate the speed.

The weight has a maximum speed of fifty miles per hour in dropping.

COLUMBUS
[W. Donald Walter]

Aeronautical Exhibits at Ohio State Fair

THE Aeronautical Building at the Ohio State Fair proved to be the biggest attraction on the grounds for the thousands of visitors. Old and young, men and women, seemed equally interested in the impressive display of airplanes and accessories. The exhibit was the most comprehensive of any staged in Columbus up to this time, including both commercial and military airplanes and equipment. We are fortunate in being located so close to Wright Field, and the personnel of the Materiel Division is to be commended for the hearty coöperation given by the Army Air Corps.

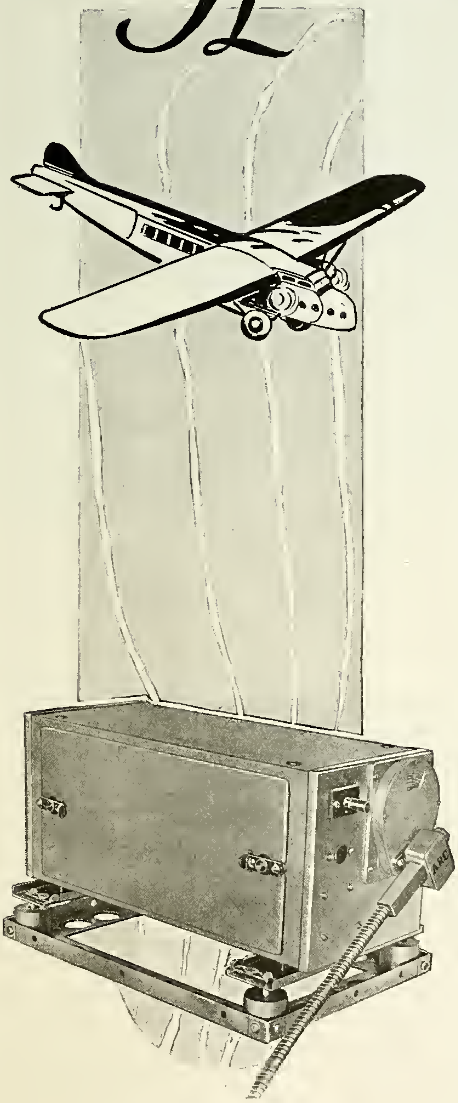
Accessories exhibited by the Air Corps were numerous and varied. Among the most interesting were the General Electric type F1 super-charger; wood, steel and alloy propellers; several complete instrument boards; and a complete fuel system mounted to show the various units.

The Navy had several small size wind tunnel scale models, apparently constructed of some aluminum alloy. Those were all old models, but interesting on account of their perfection of detail.

The Ohio Bureau of Aeronautics, of which

(*Continued on next page*)

A New Type Aircraft Receiver!



"UNIVERSAL"—COVERING THE ENTIRE AIRCRAFT RADIO SPECTRUM

NEW safety and dependability in flying operations are insured through this latest contribution to aerial security—the Stromberg-Carlson Model D Aircraft Radio Receiver. It is designed for reception on aircraft, of radio range signals, weather reports, and all other radio aids to the operation and safety of aircraft.

Adaptability to the entire aircraft radio spectrum is obtainable through the use of interchangeable Coil Sets. These Coil Sets are mounted on an individual panel with attached handle and may be inserted or removed easily and quickly.

Model D Receiver is designed especially to meet the adverse conditions encountered in aircraft service. A particularly favorable signal-to-noise ratio, accompanied by high sensitivity and selectivity, is its outstanding electrical characteristic. The extreme simplicity of the mechanical construction will appeal immediately to the aeronautical engineer as well as to the radio technician. Controls are so simplified that no special radio knowledge is necessary.

Write today for full details of Model D—one of the most important radio safety devices ever developed for use on aircraft. Every manufacturer, transport operator, and pilot should obtain full information regarding this remarkable instrument!

Model D Aircraft Receiver equipped with Eveready Raytheon 4-Pillar Tubes and powered by Eveready Dry Batteries. Over-all Dimensions of Receiver and Mounting Base: 16½ x 9½ x 9¼ inches. Weight: 18 lbs.

Aircraft Radio Corporation is the designer, sales representative and installation agent for all Aircraft Radio Equipment manufactured by Stromberg-Carlson Telephone Mfg. Co., and National Carbon Company, Inc.

AIRCRAFT RADIO CORPORATION

SUBSIDIARY OF RADIO FREQUENCY LABORATORIES, INC.

BOONTON NEW JERSEY

(Ohio News continued)

John M. Vorys is director, had a booth displaying maps of Ohio airways and airports, aerial photographs of air-marked cities throughout the State (the Bureau has been very successful in its campaign to have every town in Ohio marked for aerial identification), and placards giving information concerning licensed ships and pilots.

All in all, this was the best aeronautical show presented in Columbus upto this time, and the management of the State Fair is to be congratulated.

In addition to the aeronautical exhibition at the Ohio State Fair, an aerial carnival was staged. Three Navy fighting pilots, led by Lieut. M. B. Gardner, gave an exhibition of acrobatics over the fair grounds. Saturday, the last day of the fair, was designated as "Aviation Day," and the carnival on that day was under the auspices of the local Curtiss-Wright base, supervised by Lieut. Frank M. McKee. During the whole of the State fair week an Army type captive observation balloon carried passengers. The balloon, owned by the Aerial Advertising Association of Manchester, Maryland, had a capacity of four passengers in addition to the pilot. Many visitors to the fair took advantage of this means of viewing Columbus from the air.

BOTH ships assigned to the Air Corps Reserve at Norton Field, an O11 and a PT1, were flown to Cleveland for the James Gordon Bennett Balloon Race and the aerial carnival held at the Cleveland Airport August 30 to September 1. Lieutenant McConnell flew the O11 and Lieutenant D. Forest Rumage, Air Corps Reserve, the PT1. The officers were accompanied by mechanics Scarberry and Palmer. Major Muhlenberg flew to Cleveland for the race in his O1B. This ship was pressed into service to take the place, in a Reserve formation flight, of Captain Cohlgan's O11, which was forced down with a leaky radiator during the maneuvers. Captain Dungan, Air Corps Reserve, landed the O11 without damage.

AT A MEETING of Franklin County Air Corps Reserve officers, held in the Aero Club rooms at Port Columbus in September, it was decided to form an Air Corps Chapter, to be affiliated with the Franklin County Reserve Officers Association. Major William F. Centner, C.O., of the 308th Observation Squadron, was elected president; Walter Leach of Port Columbus, secretary; and Lieutenant Albert E. Harter, treasurer. The purpose of the organization is to work with the Reserve Officers Association and with similar Air Corps units throughout the country to further the Reserve Officers Association and to promote a better understanding of Air Corps Reserve problems.

THE D. L. Auld Company of Columbus has been testing a laminated wing material, constructed of wood and light metal bonded together. The new product, which has been very satisfactorily tested, weighs less per square foot than either metal or wood material. The process is patented. For the present, the Auld Company expects to manufacture only the material, and will not engage in the actual manufacture of the wing surfaces.

KENTUCKY

[A. W. WILLIAMS]

THE Louisville and Jefferson County Air Board has asked the Louisville Board of Park Commissioners for $70,500 as its necessary budget for next year. The board also requested $280,500 as a desirable budget to provide funds for purchase of additional real estate to enlarge Bowman Field; $7,500 for a grand stand; and $5,000 for a new entrance to the field. The budget sets salaries and operation at $12,500; $15,000 for lighting; $5,000 for fencing; and $2,500 due the Aero Club of Kentucky on a note, with $10,000 for real estate. It is desired to purchase additonal land, costing $175,000.

CITY officials of Louisville are working through Congressman M. H. Thatcher, for a War Department appropriation of $15,000 to be used in repairing and generally improving two Army hangars at Bowman Field. One of these hangars was moved back out of the way. However, they are both nothing more than tin barns, and in bad repair, whereas all other construction in the field is of brick, steel or concrete.

INDIANA

[R. HOENIG]

DURING the month of August, a total of 314 airplanes landed and took off at the South Bend, Ind., municipal airport, according to figures recently made public. This total represents an increase of thirty-five planes over the month of July, in which 279 planes landed and took off; and an increase of forty-four planes over the month of June in which 270 planes arrived and departed. The arrival of the Goodyear blimp *Puritan* during the month marked the first time that an airship has been at the local airport.

THE new $500,000-Bendix airport at the city limits of South Bend, Ind., is rapidly nearing completion, according to a recent announcement by Herbert L. Sharlock, vice president of the airport corporation.

Modern hangars and wide concrete runways will be constructed at the field. Mr. Sharlock said that it is "highly probable" that the port will be used as a stopping point by Chicago-New York air transport lines. The airport will be one of the most modern and best equipped air terminals in the country.

"While the airport will be used in research and for testing aviation accessory products manufactured by the various divisions of the Bendix Aviation Corporation," Mr. Sharlock said, "it will be available for general aviation activities to care for municipal needs of an air terminal for local and transcontinental air transport lines."

The city aviation commission has under consideration an informal proposal from the Bendix Aviation interests for municipal participation in the field.

A PROFIT of $300, realized at the semi-annual air circus at the South Bend, Ind., Municipal Airport, August 24, was announced recently by Charles W. Clemens, treasurer of the St. Joseph Valley Aviation Club, sponsors.

MICHIGAN

A MULTI-MOTORED transport, a refinement of the Ford 5-AT model, has been developed by the Ford Motor Company, according to a recent announcement of W. B. Mayo, chief engineer of the Stout Metal Airplane Division. Production of the plane has been started.

For military use, the new plane, powered with three Pratt and Whitney wasp motors, has a high speed of 155 miles per hour. The high speed of the plane fitted for commercial use as a passenger carrier, is 152.5 miles per hour. The cruising speed of the commercial plane is 122 miles per hour. The new plane retains all the features of the former 5-AT model.

The increased speeds are obtained without the expenditure of additional power, being accomplished by refinements in construction to eliminate drag.

SALE of the Ryan Aircraft plant at Lambert-St Louis Field, St. Louis, Mo., to Phil DeC. Ball, has been announced by the Detroit Aircraft Corporation, of which the Ryan company is a subsidiary. Manufacturing activities of the Ryan subsidiary were recently moved to the enlarged plant of the company at Detroit where the Ryan line will be manufactured.

The Wayne County Airport Dedicated

DEDICATORY ceremonies of the Wayne County airport were held September 4, under the supervision of the County Road Commission and the Board of County Supervisors. Edward W. Hines, chairman of the Board of County Road Commissioners, was master of ceremonies.

Included in the events held in connection with the dedicatory ceremonies were aerial maneuvers of the First Pursuit Group, Selfridge Field, and the 107th Observation Squadron, Michigan National Guard.

The Wayne County airport is one mile square and of this area, 520 acres are available for landing and taking off. This area is drained by a system which includes 250 miles of pipe. Present plans call for the construction of six landing and take-off runways, each 3,500 feet in length. Each of these runways will be 100 feet wide, with safety strips 200 feet wide on either side. At present there are four concrete runways at the field, with a maximum length of 3,500 feet.

All activity at the field will be controlled from an operations tower located in the main hangar and entirely enclosed in glass. The Government Weather Bureau, which

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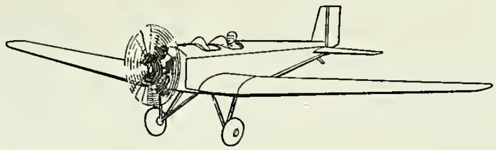


(Michigan News continued)

will give weather service twenty-four hours a day, is located in this tower. Installation of a poly-directional radio range direction finder at the field was recently completed by the Department of Commerce.

The United States Treasury Department has designated this field as a port of entry for customs and immigration.

[K. F. Zeisler]

AIRPORT construction throughout the State is proceeding rapidly. Lapeer, Ionia and Ironwood are cities recently completing new fields. A field is being prepared at Marshall.

FOSTER AIRWAYS, Lansing, has extended passenger service across the Upper Peninsula, serving St. Ignace, Newberry, Crystal Falls, Escanaba and Iron Mountain.

[J. M. Hill]

MID-WESTERN School of Gliding has changed its base of operations from St. Joseph to the Twin City airport at Benton Harbor, Michigan.

CHEBOYGAN and Cheboygan County, Michigan, have purchased site of 156 acres which will be jointly developed into an airport. Initial appropriation is $5,000.

LANSING Union No. 665, International Brotherhood of Electrical Workers, passed a resolution recently declaring that it will use air mail exclusively in all out-of-town correspondence.

LICENSE to operate a ground and private pilot flying school has been granted the Royal Oak Flying Service, operating from the Royal Oak Airport, at Royal Oak, by the Michigan Board of Aeronatuics. Truman W. Miller will be instructor at the school.

LICENSE to operate a private pilot school has been granted the Jackson Flying School, Reynolds Municipal Airport, Jackson, by the Michigan Board of Aeronautics. R. C. Donley is manager of the school. Kenneth Crouch is instructor.

MUSKEGON County Airport, Muskegon, Mich., was dedicated September 10, L. H. Neilsen is manager of the airport.

WILLIAM B. MAYO, chief engineer of the Ford Motor Company, was reelected chairman of the Michigan Board of Aeronautics at the annual meeting of the board recently. Major Floyd E. Evans, commanding officer of the 107th National Guard Squadron, Detroit, was named vice chairman, succeeding Claude S. Carney, of Kalamazoo.

Licenses were granted by the board to eight airports, as follows: Marysville Airport, Ann Arbor, Municipal Airport, Upper Peninsula Airways field at Escanaba, Owosso Airport, Crystal Falls Airport, Ford Motor field at Iron Mountain, Niles Municipal Airport and Alpena Airport.

Airport managers who were given licenses by the board are as follows: H. Dora, Bay City Municipal Airport; J. A. Saunders, Crystal Falls Airport; Harold Westcoat, U. P. Airways Field, Escanaba; A. Nelson, Iron Mountain Airport; George Johnston, Saunders Airport, Cadillac; John C. Barron, Marysville Airport; William J. Wallace, Detroit City Airport; J. E. Behse, Saginaw Airport.

Schools receiving permanent operating licenses were as follows:

Limited Commercial: Becker-Forner Flying Service, Jackson. Private: Foster Airways, Inc., Lansing; Battle Creek Flying School; Cushman Flying School, Kalamazoo; Knowles Flying Service, Detroit; Davis and Felix Airways, Inc., Battle Creek.

Twenty-four flying instructor licenses were issued by the board, with twelve ground instructor permits also being authorized.

Capt. Ray Collins, director of the board, made a report of the department's activities for the initial year of its existence.

ILLINOIS

Dedication of Joliet Airport Held

DEDICATION of the Joliet Municipal Airport, Joliet, Ill., developed at a cost of $300,000, was held September 6-7. The field is located four and one-half miles west of Joliet.

It has been announced by Youngberg, Brown and Youngberg, Airport Engineers, Chicago, that the field is equipped with facilities for the convenience of the air traveler, and that day and night service is provided.

A combination administration and hangar building has been constructed at the field. This building contains waiting room, restaurant, offices, first aid, baggage and mail rooms, pilot's lounge and dormitory, repair shop and hangar space. The entire building is designed as a modern airways depot.

The field is 2,500 feet by 2,750 feet. The surface has been leveled and graded. A lighting system has been installed. The entire field has been fenced. A parking space for 2,000 cars has been graveled and is accessible from two highways. The field is free from surrounding obstructions since the high tension line and telephone trunk line were placed underground. The entire field was designed by the engineers to allow for future expansion.

NATIONAL AIR TRANSPORT has purchased the Stout Air Services, according to a recent announcement of Lester D. Seymour, vice president and general manager of N. A. T. The activities of N. A. T. and the Stout Company will be merged according to present plans. National Air Transport is carrier of air mail and express between New York, Chicago and Dallas. The Stout Air Services operates an air transport passenger service between Chicago and Detroit, and Detroit and Cleveland. Both companies are divisions of the United Aircraft and Transport Corporation.

WISCONSIN

[W. Scollard]

THE extension division of the University of Wisconsin has announced a full-time program of instruction in aeronautics, in response to growing demand for such training from many parts of the State. Plans for several courses on the subject have been announced by Dean Chester D. Snell. Clinton D. Case has been appointed assistant professor in charge of aeronautics instruction.

THE Kohler Aviation Corporation of Milwaukee celebrated its first anniversary August 31. The air service connects Milwaukee with Muskegon and Grand Rapids, Mich. During the year, 2,432 passengers were carried in addition to 52,757 pounds of freight and express without a single accident.

STEPHEN F. BRIGGS has been named president of the Milwaukee chapter, National Aeronautical Association. Other officers elected are: M. H. Nichols, first vice president; Max Friedman, second vice president; Dan Kiser, third vice president; J. A. McLeod, Jr., secretary; Charles R. McCallum, treasurer, and J. A. McLeod and Hans Herzfeld, directors. Clarence R. Falk, retiring president, was named honorary president.

IOWA

[R. W. Moorhead]

THE new Iowa law establishing air traffic rules prohibits airplanes from flying over open-air crowds at a height of less than 1,000 feet and then only with consent of the Secretary of State:

MORE than 5,000 persons were present at the air circus held in connection with the opening of the new Hawkeye Airways Airport, Washington, Iowa. The field is situated three miles southwest of the city on the highest point in Washington County. Don Halley, vice president of the Rapid Air Lines, Inc., Omaha, was one of the speakers who addressed those attending.

AIR races were held September 21 at Algona, Iowa. The meet was sponsored by the Hagg Post of the American Legion at their new airport, two and a half miles northwest of the town.

NEBRASKA

[J. R. Lowell]

Boeing Suit Against Gasoline Tax on Interstate Planes

THE Legal Department of Nebraska has decided to make no further attempt to compel payment of a gasoline tax by Boeing Air Transport on liquid fuel consumed in its airplanes making interstate flights through the State. A decree will be entered by stipulation in the district court of Lancaster County, Nebraska, enjoining collection of the tax except on gasoline used lo-

(Continued on next page)


"Pirate"
DEPENDABILITY
IN LINE
BUILT TO FLY AN AEROPLANE
INVERTED
BUILT TO FIT AN AEROPLANE
PLUS - MINIMUM FRONTAL AREA
The MENASCO PIRATE
AIRCRAFT ENGINE REPRESENTS THE FINEST IN MAERIALS AND WORKMANSHIP
90 HP AT 1925 R·P·M
MENASCO MOTORS INC
6718 McKINLEY AVE LOS ANGELES CALIF.

(*Nebraska News continued*)

cally in the company's trucks and automobiles, or on flights of its aircraft between points in Nebraska. As the company had originally indicated its willingness to pay tax on gasoline so used, the outcome is virtually a complete victory for it.

Nearly all the gasoline consumed in the Boeing airplanes in service through Nebraska will be relieved from tax by the stipulated decree. Only a small percentage of its total consumption is used for trips within the State, or in ground surface vehicles. The State reserves the right to reopen the case if the United States Supreme Court should at any time change its ruling in the matter.

THE Hay Springs, Neb., Airlines, Inc., has filed articles of incorporation. Authorized capital stock is $10,000. The company will transport passengers and freight, conduct an aviation school and develop landing fields. The incorporators are George W. O'Halloran, Edward C. Waterman, Harry L. Magowan, Leo Gardeslewski, Glenn C. Pierce, Carl E. Horn and Charles Lembrich.

York Air Service of York, Neb., has filed articles of incorporation, with an authorized capital stock of $25,000. Howard C. Schultz, Cora M. Chapman and Yale B. Chapman are the incorporators. The company will operate a flying school and an air taxi service.

MISSOURI

[M. Sheetz]

First State Air Tour

MISSOURI'S first State Air Tour left Jefferson City September 18 for a three-day trip. The tour was sponsored by the State Chamber of Commerce, with the aviation committee of the Chamber in active charge of all arrangements. About twenty planes composed the caravan, led by a pilot ship carrying Dwight H. Brown and other State officials. Nine cities on the route were as follows: Cape Girardeau, Springfield and Carthage on the first day; Kansas City, St. Joseph and Trenton on the second; and Kirksville, Palmyra and St. Louis on the third day.

THE special committee on air law of the Missouri Bar Association met in a Columbia September 3 to draft a law regarding the use of aircraft. This draft was to be submitted at the annual meeting of the association late in September. If passed upon favorably at that time the law will be submitted to the Legislature. Members of the committee are: C. S. German, chairman; Leland Hazard, Samuel J. Liberman, Dean J. L. Parks of the Law School of the University of Missouri; N. T. Cave, and A. L. McCawley.

KANSAS CITY'S newest passenger line is Eagle Airlines, operating a daily service between Kansas City and Minneapolis and St. Paul. American Eagle monoplanes are used, leaving both north and south terminals at 8:30 a. m. Des Moines is an intermediate stop, where connections are made with Boeing. Mason City, Iowa, is a flag stop. Wold-Chamberlain Field is the Minneapolis terminal and Fairfax Airport the Kansas City base. Erle H. Smith is manager of the new line.

ST. LOUIS

THIS year's paving, grading and drainage program, involving an expenditure of more than $200,000, was recently completed at Lambert-St. Louis Field. The drainage laid this summer cost the city $73,500. Runways cost $67,500 and the construction of concrete roads $55,600. Grading entailed an expenditure of $3,900.

INSTALLATION of a seven-foot wire fence has been completed along the west side of Lambert-St. Louis Field. A permanent circle marking the center of the landing area has also been intsalled. It is of concrete and is 100 feet in diameter.

SHELTON AIRLINES resumed operations between St. Louis, Columbia, Fulton and Jefferson City, Mo., September 15. The St. Louis base has been transferred from Lambert-St. Louis Feild to Curtiss-Steinberg Airport.

[T. P. Wagner]

IN the five months ending September 1, a total of 20,422 passengers on regularly scheduled trips passed through Lambert-St. Louis Field. There were 10,800 inbound passengers and 9,542 outbound. Three airlines, T.A.T.-Maddux, Universal and Safeway, use the airport.

THE Pelican Club, organized to provide members with flying time at a reasonable cost, has purchased a Waco ship and established headquarters at Curtiss-Steinberg Airport. Members of the club are: Henry Hitchcock, Festus J. Wade, Kurt Schrader, I. F. Boyd, Jr., Frank Hickman and George Parker.

FIELD MANAGER PARKS, Lambert-St. Louis Field, has started a movement for the replacement of tail skids with wheels on all planes using the municipal airport, in order to lessen the wear and tear on composition runways and the landing area turf. All operators using the airport will be requested to remove the skids, particularly during the winter months.

OKLAHOMA

A SUIT to test the ruling of the State Industrial Commission of Oklahoma that flying an airplane comes under the hazardous employment specifications in the State workmen's compensation act was filed with the State Supreme Court, September 5.

The appeal was from the Commission award to Kenneth P. Enlows, made August 8, and was filed by the Fort Smith Aircraft Company. Enlows was given compensation of $18 a week on total disaibilty together with all medical expenses.

The appeal states that Enlows was an aviator with transport license, employed by the company. He was flying a plane in which he took off from the airport of the company, near Fort Smith, Ark. He was in Oklahoma when injured.

The petition contended that he was not in the employment of the company at that particular tme, as he was on his way with a student to examine duck blinds on the Arkansas River. It was stated that the Commission erred in placing the duty of flying an airplane under the provisions of the compensation act, declaring that flying an airplane was not included in the hazardous employments specified in the act.

TEXAS

[C. Morris]

THE Dallas Chamber of Commerce will sponsor a series of good-will tours to cities in Texas and Oklahoma. The trips will be made in fourteen Army Air Corps planes from Hensley Field, Dallas, Chamber of Commerce and city officials participating. These trips are part of the training of the North Texas United States Air Corps Reserves. The cities visited are Corsicana, Waco, Cleburne, Fort Worth, Wichita Falls, Gainsville, Denton, Sherman, Denison, Paris, Commerce, and Hugo, O.

MEXIA Flying Club, Mexia, Tex., has been incorporated by Dr. M. M. Brown, B. L. Walkup, and S. E. Adamson. The capital stock is $4,275.

ALL Army Air Corps facilities have been transferred from Hangars No. 2 and 3 at Love Field, Dallas, to Hensley Field, Dallas, following the completion of the Government hangar at the latter field. The third Reserve officers training camp was held recently with Lieut. Harry Weddington as the executive officer.

DAMAGES at Houston Airport, Houston, totaled about $50,000 when a cyclone accompanied by rain and hail caved in the rear of hangar No. 2. Five planes in the hangar were damaged.

CONTRACT for the remodeling of offices in the municipal hangar at the El Paso municipal airport have been awarded by the city council to J. C. McElroy. The offices are being rebuilt to accommodate Government officials at a cost of over $1,700. New flood and boundary lights will be installed at an estimated cost of $2,500.

RECENT improvements at Lubbock Municipal Airport include the construction of a hangar, eighty-five feet by 148 feet, and the conditioning of the entire tract of 640 acres. Boundary lights will be installed and the airport will be marked.

SAN ANTONIO

[M. Cooper]

THE Bowen interests in Fort Worth, Texas, are reported among the principal bidders of the southern leg of the Southern Transcontinental airlines and it is reported that if they are successful they will immediately institute a passenger line in connection with the air mail line between New Orleans, Louisiana and Los Angeles via Houston, San Antonio, Midland and

(*Continued on next page*)

(Texas News continued)

El Paso. They have tentatively contracted for six ten-passenger planes. If this contract is obtained, the Bowen interests plan to purchase the Lord line between San Antonio and Monterrey with the idea of extending the line into Mexico City.

THE administration office of the Southern Air Transport Division of the American Airways, Inc., have been transferred to San Antonio from Fort Worth.

ALABAMA

AN AERONAUTICAL option for students in the school of engineering of Alabama Polytechnic Institute, Auburn, Ala., was recently announced. Courses in aerodynamics, airplane design, airplane engine design and aeronautical research methods will be offered. A course in ground school subjects will be given during the regular session. Arrangements with a flying school to give students desiring to become pilots practical flying instruction during the summer vacation period will be effected. The aeronautical courses will be under the supervision of Lieut. Volney C. Finch, Professor of Aeronautical Engineering.

[O. G. JONES]

THE 106th Observation Squadron of the Alabama National Guard has returned to Roberts Field from a two weeks' training period at Camp McClellan near Annison.

SELMA, Ala., has purchased the intermediate landing field used by the Government and will operate it as a municipal field. The field is now provided with about $6,000 worth of equipment.

SOUTH CAROLINA

[B. WORKMAN]

ON THE NIGHT of August 20, the city of Greenville established a new world's record for air mail dispatched on an initial flight. The former record of 563 pounds, held by St. Petersburg, Fla., was broken by 504 pounds, fifty-nine pounds short of doubling the record. The total poundage of 1,067 pounds was comprised of 29,700 pieces of mail, over one piece for every inhabitant of the city.

Three planes carried the mail from here and one made a trip to Atlanta with southbound mail and returned to carry the surplus poundage to Richmond late that night. George Branson left the airport at 9:30 o'clock for Atlanta with the first air mail to leave the city. At 9:35 Dick Merrill, flying the northbound mail, arrived and was gone in twelve minutes. Twenty-seven minutes later, Johnny Kytle arrived from the north, bringing the first air mail to reach Greenville directly by plane. He brought seven pouches of mail labeled for Greenville.

Before a crowd of spectators, estimated at between 15,000 and 20,000 persons, each of the pilots was presented with an engraved cigarette case. Credit for this poundage is due to the Greenville Airport Commission and to the Junior Chamber of Commerce.

NEW PUBLICATIONS

Brief Reviews of Texts, Handbooks and Novels of Aeronautical Interest

From the Ground Up

By WILLIAM A. SIMONDS and FRED L. BLACK

"FROM THE GROUND UP," written for boys, describes the adventures of a young Dearborn youth, Pat Callahan, who determined to learn about aviation. Aided by country club friends who interested themselves in him because of his prowess in golf while a caddy on the links, Pat has many experiences. He served as a flight escort on a transport plane, read the weather signs at a weather bureau station, made a flight in a dirigible. He went through an airplane factory from one end where the raw materials entered, to the other end where the finished plane was taken out for its first tests and rode in a plane that was being tested.

The book presents a unique and informative survey of aeronautics learned from the men engaged in it.

Engineering Materials, Vol. III

Revised Edition of Aircraft and Automobile Materials (Ferrous)

By ARTHUR W. JUDGE

AN ELEMENTARY account of the theory and strength properties of materials so as to enable the student, engineer, and user of materials in general to appreciate the importance of material specifications, applications and test methods, is given in "Engineering Materials, Vol. III." The work represents a revised and extended account of the section of the author's "Aircraft and Automobile Materials, Vol. I, Ferrous," dealing with the theory and testing of materials. In the revision of this work, the inclusion of new material necessitated its separation into two volumes dealing respectively with the "Properties of Ferrous Metals" and "Theory and Testing of Materials." The former volume was published as "Engineering Materials, Vol. I."

Particular attention is devoted to metal fatigue, properties of metals at higher temperatures, hardness, abrasion and wear, stress determination and theories of materials.

A general account of the application of materials is the object of this work. Footnotes are provided to indicate the sources of more detailed information.

Five Years of Research in Industry 1926-1930

By CLARENCE J. WEST

A READING list of selected articles from the technical press compiled by Mr. West of the National Research Council comprises "Five Years of Research in Industry." The primary purpose of this book is to present a cross-section of important research activities covering a wide range of industries. Books, general articles and technical articles published during this period are listed under the headings of the various industries, which are arranged in alphabetical order. The author and title of each article, and the publication in which it appeared are listed. Practically two pages are devoted to the technical aeronautical articles published during the past five years.

The Air Annual of the British Empire, 1930

Editor: Squadron-Leader C. G. BURGE

A RESUME of aeronautical activity throughout the British Empire during 1929 is contained in the "Air Annual of the British Emipre, 1930." Discussions of various phases of aeronautics are given by recognized authorities on such subjects as air transportation, military development, technical progress in heavier-than-air and lighter-than-aircraft design, commercial aviation in the colonies, and sport flying throughout the British Empire, especially flying club and gliding activities. The solutions of various problems pertaining to the organization of civil aviation and the management of aeronautical activities are discussed.

Considerable data are contained in the reference section on the British aviation industry, including figures on airlines operated, airports, specifications of aircraft, engines and equipment, production and exports as compared with those of foreign countries, and data on the operation of flyng clubs.

British aeronautical organizations and societies, both governmental and civil, schools, air publications and official and commercial representatives of the industry are listed.

Air Navigation Bulletin

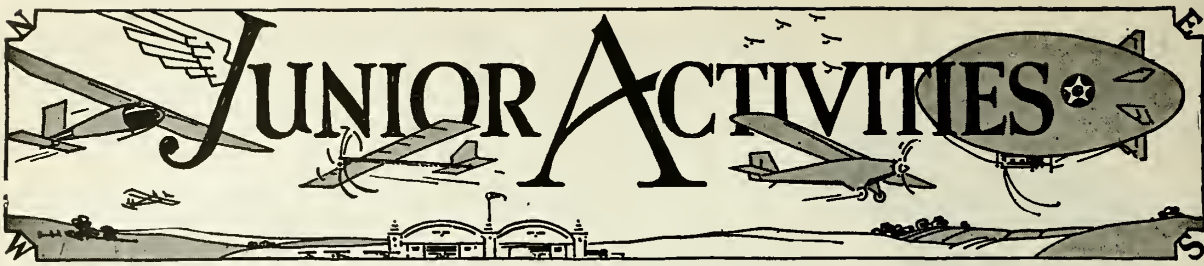
OFFICIAL Bulletin No. 15, International Commission for Air Navigation, Paris, 1929, is being distributed by the World Peace Foundation, Boston, American agents. Some of the more important international regulations affecting aircraft are treated in the publication.

The complete text of the international convention on air navigaton, treaties, and articles on the status of chartered aircraft, compilation of air traffic statistics, identification of aircraft affecting transport for the League of Nations, and the revision of the international signal code are included in this number of the bulletin.

Beginner's Book of Model Airplanes

By CARL H. CLAUDY

INFORMAL discussion of "why" and "how" model airplanes fly are contained in the "Beginner's Book of Model Airplanes," written for educational purposes rather than as a "how to make book," a handbook or manual. It is based on the premise that model planes are not toys but are ideal for the demonstration of the fundamentals of aeronautics. No scale models are described. The book illustrates the standard types of racing and duration model planes built to fly by applying the principles of aeronautical engineering. A glossary of practical aviation terms is given. The text is illustrated with drawings.



THE "CAPE CODDER" SAILPLANE

A SIMPLE 30-INCH GLIDER

By

R. E. DOWD

THIS month we are going to study a nifty little soaring monoplane so simple in design that anyone can build it. There are only a few parts, and in about two or three hours of work it can be finished, ready to take the air.

The performance is not simply good. It is amazing! Here's how it all happened. My vacation plans for this summer called for another trip to Cape Cod. Last year the "Yardsticker" sailplane (described in September AERO DIGEST) was taken to the Cape for soaring experiments. It performed very well, but it was quite evident that certain changes in design would make it even better. Accordingly these were worked out, and the little "Cape Codder" is the result. Its performance has exceeded all expectations.

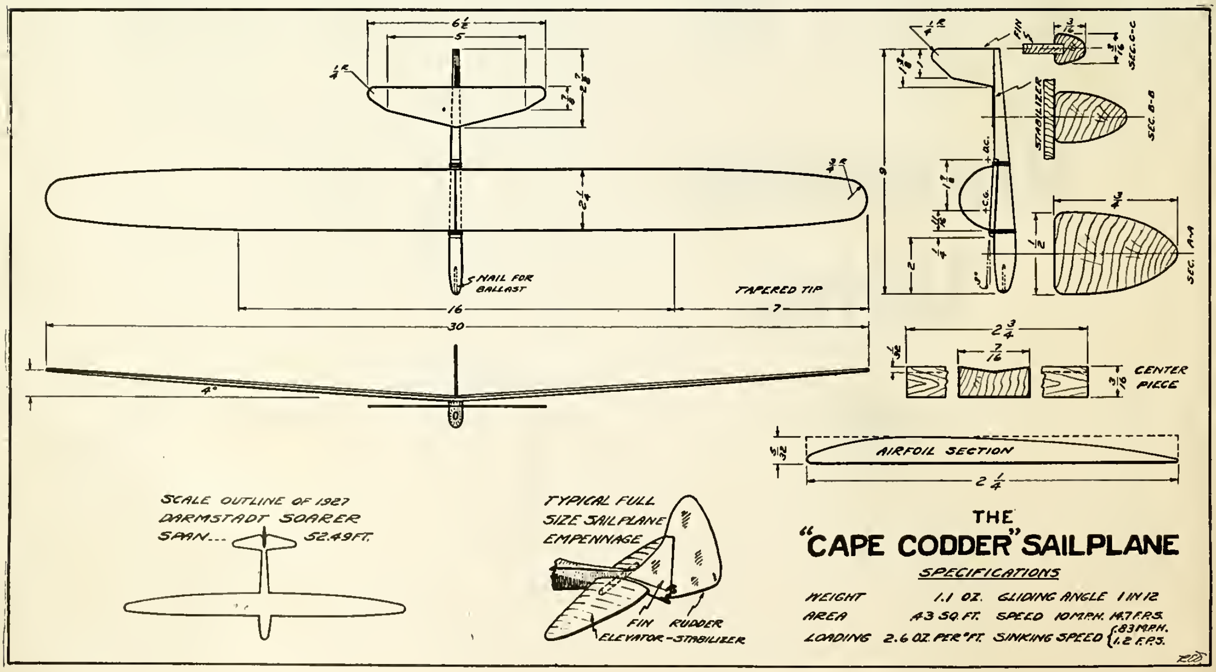
At the Cape God Glider school at South Wellfleet, Massachusetts, August 27th, there was a light wind blowing from the northeast. The students were practicing "S" turns with the primary type gliders, the wind being too light for extended glides or real soaring. Since it did seem just about right for the Cape Codder, however, a few practice flights were attempted from a small sand dune some distance from the steep ridge, which rises up from the narrow beach. After a few adjustments to the craft, several beautiful flights of 100 to 300 feet were made. But what a temptation that 100-foot ridge was! Several times the little Cape Codder circled over near it as though to take a peak at the giant breakers which were thundering in on the sandy beach. "She seems to be itching for a trip over the ridge," I remarked to Ken Doe, glider pilot, who was at the school to get some soaring experience.

"I'll bet she'll soar on this wind if you'll take a chance on losing her. Why don't you try it?" he suggested.

"Okay," I said, "but let's get a picture first for if she sets out on a non-stop to Europe, or does a high dive for the old Atlantic, it's going to be good-bye Cape Codder."

The picture was quickly taken, and a few minutes later the Cape Codder was on its way out over the ocean. And what a flight! After the first minute she was higher than the starting point and a full quarter of a mile off shore, rising and sinking, veering first to the right and then to the left. So perfect was its stability, and so positive its direction, that it was difficult to remember it was only an inert assembly of wood, obeying natural laws of flight. On and on it flew and we were soon straining our eyes to keep it in sight.

It is difficult to express the exhileration which comes over one at such a time. After our best efforts have gone into the design and construction of a new creation, it is first of all a keen source of satisfaction to see it perform successfully. But as each maneuver is followed it seems to be endowed with a personality. It acts alive, and we find ourselves cheering and shouting



Launching two gliders with their wing tips attached

directions to it. We even find ourselves dreading a landing in the water, not because of the loss of the model but because of this feeling that it really is more than an assembly of wood and glue.

Perhaps this sounds far-fetched, but if my readers will reserve censure until they have witnessed such a demonstration, it is more than likely that they themselves will be in the cheering squad.

Just as we were about to give up hope of ever seeing our model again she gradually turned, flying parallel with the ridge. Another turn and she was headed back towards land. For a moment she seemed to be coming right back over our heads, then another turn out to sea again. Several such turns followed, and finally there was a noticeable loss of height, perhaps caused by a down current. We watched breathlessly to see if our little voyager would land on the dry sand or plunge into the 10-foot surf. It seemed ages before she settled to the beach high and dry. Little Paul and Arthur Lussier, natives of Cape Cod, dashed down the steep sandy ridge to recover it. As a reward they were permitted to fly it as shown in the accompanying picture. Many other flights were made, but that first was never equaled. It was a masterpiece of chance.

But let's build it. Here's what you need:

Wood

One piece balsa 5/32 by 2¼ by 30 inches or two pieces 15 inches long for wings.

One piece balsa 1/16 by 1½ by 6½ for stabilizer.

One piece balsa 1/16 by 1½ by 2⅜ for fin.

One piece balsa ½ by ¾ by 9 for fuselage.

One piece spruce, basswood or white pine 3/16 by 7/16 by 2¾ for center piece.

Two rubber bands.

Nails for ballast.

Ambroid or similar cement.

The Fuselage, Fin and Stabilizer

The fuselage is a good starting point. Just whittle and sand paper the balsa stick to the size given. Sections A-A, B-B and C-C are shown actual size. The notch for the plane mounting must be carefully cut so that the angle of incidence is three degrees as shown. This means that the notch is ⅛ inch deep at the deepest point and tapers up to the top of the fuselage in a distance of 2¾ inches.

After the fuselage is finished, the fin and stablizer may be cut to size from the 1/16 inch balsa wood, using sharp scissors or a safety razor blade. A 1/16 by 1/16 groove in the top of the fuselage is used to hold the fin in place with cement. (See Sec. C-C.) The stabilizer is simply cemented to the top of the fuselage. (See Sec. B-B.)

The Main Wing

Although the main plane can be made from two separate 15-inch pieces of balsa wood, it is easier to make it in one piece. The balsa board 5/32 by 2¼ by 30 is planed or scraped to the sections shown. This section is uniform for a distance of 16 inches. The seven-inch tips taper to the round wing tips of a ¾ inch radius. The edges are carefully sandpapered to reduce air resistance. Up to this point the whole plane is flat.

The bolster or center piece is next made with the V-shaped groove on the top. Good white pine, spruce or basswood is excellent for this. Now, we're ready for the dihedral angle, which we can see is about four degrees or one inch at the tip. A knife line scored on the top side of the plane at the exact center will localize the break, for we are going to crack it carefully at this

Paul and Arthur Lussier flying one of the "Cape Codder" sailplanes.

point. It is better to avoid the use of water on the joint because the cement seems to hold better on balsa which has not been soaked. When the proper angle is obtained, the parts are set in their correct positions and a liberal coating of cement is applied, not only between the bolster and the wing, but also on top of the wing over the seam. Allow plenty of time for this joint to set before disturbing, since it must be strong and rugged to withstand landing shocks.

Now all we need to do is to fix the finished wing in place, using rubber bands which wrap over the stubs of the bolster and pass around the fuselage. If the bands are large, they may be wrapped several times around.

Now our Cape Codder is all complete except for the ballast. By this time you all know why we need ballast. It is for balance, of course. So far each part has weighed whatever it happened to weigh, and we have assembled them without regard to the center of weight, or as we call it, the center of gravity. (C. G.). Of course, we cannot expect our model to be correctly balanced by accident, for the center of lift of the wing is at a certain point for a certain angle of flight, and our center of gravity (C. G.) must coincide with the center of lift or pressure (C. P.).

The balancing point will be found just about 11 1/16 back from the leading edge of the wing. To move our C. G. to that point it is only necessary to force a nail into the balsa wood fuselage at the nose. The nail can be cut down in length until just the correct balance is secured, when it can be cemented in place. The head should be filed smooth and slightly rounded to fit the fuselage better.

Flying

Well, here we are all set, ready for the first trial flight. Fairly calm weather is always best for checking a new model. Launch it gently against whatever wind may be blowing. Final adjustments can be made for balance by sliding the wing forward or backward slightly. For directional adjustment it is better to twist the leading edge of the high wing down instead of using the rudder since it acts so much farther from the C. G. A slight upturn on the trailing edge of the stabilizer will help stability if the soarer is found too sensitive.

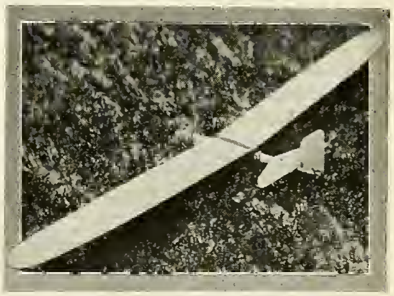
Interesting Points

It will be noted that the Cape Codder is extremely short for its wing span. The length is only nine inches, whereas the span is 30 inches. This is often referred to as a "short coupled" design. The trend of design seems to be in this direction. Of course, the extreme case is the modern tailless type of glider, which we shall study later.

By way of comparison we can check the proportions of the Cape Codder with the famous Darmstadt, which is outlined in scale on the large drawing. Although the Darmstadt is shorter than most power-driven planes for its span, our little model beats even that. Another interesting comparison is to be found in the empennage or tail. Our model, like the famous soaring type, the *Professor*, has the horizontal surface forward of the vertical surface. This too is shown in the drawing. Note also that the *Professor* has no fixed angle stablizer. In fact, it has no stabilizer at all. The elevator, which turns on a horizontal axis, acts as a stabilizer. Of course, this makes the control very sensitive, but soaring pilots are skillful and experienced, and prefer to have complete mastery of their gliders rather than a greater degree of inherent stability.

In view of our previous study of fin areas

(*Continued on following page*)



The "Cape Codder" model sailplane

on other models, it is of interest here to check the conditions as found in the little Cape Codder, which has exceptional directional and general stability. As indicated the center of lateral area, or the directional center (D. C.), is 1⅞ inches back of the center of gravity. This corresponds to .048 times span plus length or 30 plus 9. It will be recalled that the empirical formula mentioned uses a factor ranging from .025 to .050, and we find in this case that it is very near the latter. This, of course, is not an infallible rule, but since it has worked out in so many cases, it perhaps has some value.

Simple Calculations

As mentioned before in this section, model gliders can be made the subjects of very interesting calculations, which give us a further insight into matters of design. Let's follow this study through, basing our investigation on only five known facts. These arc weight, span, area, gliding speed (still air) and gliding angle (still air). We obtain these values by weighing, measuring and timing, and all are easy to determine.

With this start we soon know quite a lot about our model. Here's how we proceed item by item:

Known Facts

Weight........................ 1.1 ounces
Span....................30 inches—2.5 feet
Area.....62.7 square inches—.43 square feet

Gliding speed........10 m.p.h.—14.7 F.P.S.
Gliding angle........................1 in 12

$$\text{Wing Loading} = \frac{\text{Weight}}{\text{Area}} = \frac{1.1}{.43} = 2.6 \text{ oz./sq. ft.}$$

$$\text{Mean Chord} = \frac{\text{Area}}{\text{Span}} = \frac{.43}{2.5} = .168 \text{ ft. or } 2.01 \text{ in.}$$

$$\text{Aspect Ratio} = \frac{\text{Span}}{\text{Mean Chord}} = \frac{30}{2} = 15 \text{ in.}$$

Lift—drift ratio or for complete model $\frac{L}{D}$ = 12 or the gliding angle.

Resistance or tow line drag = 1/12 times weight or 1.1 = .09 ounce.

Note—This would correspond to propeller thrust required to sustain the model, if equipped with a propeller and power without changing its other characteristics.

$$\text{Sinking speed} = \frac{\text{Gliding Speed}}{\text{Gliding Angle}} \text{ or } \frac{14.7}{12} =$$

1.2 F.P.S.

In other words, this model soars in a wind having a vertical velocity of only 1.2 feet per second.

Now, that wasn't so difficult after all, was it? You can have lots of fun figuring out your own Cape Codder, for it will probably work out slightly different, due to weight, flying speed, etc.

Some Flying Stunts

The Tail Flip—Because of the short coupled design of the Cape Codder, it is possible to work a little trick in launching which will increase distances and durations. To get the idea, just hold your finished model, after she is all balanced and adjusted, up at arms length by gripping the nose of the fuselage with the tail down. Have the top of the model towards you and let it hang vertically down. Now release it. I'll bet you were surprised when she flipped right down over and started to glide away from you with only a foot or so lost height. In the absence of a name for this we can call it a tail flip. Now you can doubtless see how the short coupled design helps to accomplish this. Well, here's the big idea. If you can do this maneuver 50 or 75 feet in the air, the little Cape Codder is all set for *twelve* times that height in distance, for that is its gliding angle. It calls for skill, but you can do it easily by launching straight up. Probably the first time you'll over-power it, and you'll get a complete loop. After a few trials you will find just the right power to leave the poor Cape Codder "high and dry" with tail down at a good altitude. If you have done it correctly, she'll do a tail flip and start out on a glorious glide.

Team Flying—By this time you have doubtless noticed the illustration of a double glider and wondered what it is. Here's the secret. Just two Cape Codders with the wing tips fastened together with rubber strands by overlapping about four inches. This sounds too simple to be of any value, but just try it and you'll get the surprise of your life. Both models must be exactly alike in weight and design, of course, or else one will have a faster flying speed. The remarkable thing about the experiment is that the performance is greatly improved, even though the overlapping wing tips mean a considerable loss of lift at that point. This is real "team work."

While the results are astounding, there is little mystery connected with it. Here's what happens. The weight is doubled which is an important factor in soaring. The aspect ratio has been approximately doubled, which aids efficiency. The center section composed of the two inner wings is horizontal, reducing lost lift. The outer wings make excellent dihedral angles for lateral stability. The tails remain unchanged eliminating the usual increase of length and size of the fuselage.

It would be of great interest to try bigger teams, say, three, four, or five in a team. This could be easily done by omitting the dihedral entirely from the center models. Who will be the first to try this out and report back to this department? It should work out very efficiently. We're wishing you good luck and lots of fun with your Cape Codders, but don't forget these high spots:

What five things should you know about a model? If you have these, how can you figure the following:

(a) Wing loading.
(b) Mean chord.
(c) Aspect ratio.
(d) L/D ratio.
(e) Resistance.
(f) Sinking speed.

What advantage is a slow sinking speed?

WALLACE HAND JOINTER

THE new eight-inch hand jointer produced by J. D. Wallace and Company of Chicago, employs a skew knife cutterhead instead of the ordinary straight knife head. Although jointer cutterheads with skew or spiral knives are not unknown to the woodworking industry, they were never produced in a quantity because of the high cost of manufacturing and the difficulty of sharpening and setting the knives. The Wallace skew knife cutterhead was designed for quantity production, ease of maintenance and a maximum skew angle for the knife.

The cutterhead is die-cast duralumin on a steel shaft. The knives lie on the flat surfaces and are clamped in position with the die-cast duralumin cover plates which receive bolts and washers. The holes for these bolts are tapped into the center steel shaft, and as the washers extend over the top surfaces of the knives, all of the load put on the knives is transmitted directly from steel to steel. The bolts are screwed in with a hexagonal wrench, supplied with the machine. Chip breaking grooves are milled in the head. The entire assembly is then balanced on a dynamic balancing machine.

It is clear that a straight edged knife set askew will not cut a level surface, since the two ends of the knives will project farther from the axis of the cutterhead than the center of the knives. In the Wallace jointer, in which one end of a knife blade is set one-half inch ahead of the other end, the concavity amounts to .005 of an inch. This curvature, however, is objectionable. It is eliminated by placing the knives in the machine, starting the motor, and holding the Wallace knife jointer on the table across the knives. The table is lowered until all parts of the knife blades have been jointed.

The cutterhead is mounted on roller bearings. The table is of cast semi-steel. An improved and simple guard is supplied with the machine.

ELECTRIC HOISTS

PRODUCTION of electric hoists ranging in capacities from one-eighth to seven and a half tons was recently announced by the Hoist and Crane Division of Robbins & Meyers, Inc., of Springfield, Ohio. They are equipped with a cast steel trolley adjustable to nine sizes of I-beams. An enclosed bottom block retains the rope on the sheaves and shrouds all parts to facilitate the guiding of the rope into the rope-flare when swinging.

The hoists are equipped with main frames of Aremite alloy metal with a tensile strength estimated at 35,000 pounds per square inch. The hoister mechanism is provided with Hyatt roller bearings specified and approved by the Hyatt Roller Bearing Company.

The gearing is of alloy steel, heat treated to specifications to withstand the strain of reversing tooth loads at top speeds. The hoists are aluminum finished throughout.

UNITED STATES CIVIL SERVICE EXAMINATION

THE United States Civil Service Commission announces an open competitive examination for the position of Aeronautical Designer, with a salary of $2,600 to $3,200 a year. A vacancy in this position in the Materiel Division, Air Corps, Wright Field, Dayton, Ohio, at the salary indicated, and vacancies occurring in positions requiring similar qualifications, in the same locality, or other places within the Sixth Civil Service District (Ohio, Indiana and Kentucky) at approximately the same rate of pay, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer or promotion.

The entrance salary within the range stated will depend upon the qualifications of the appointee as shown in the examination, and the duty to which assigned.

This examination is open to all citizens of the United States who meet the requirements; the department or office requesting certification of eligibles has the legal right to specify the sex desired. For this position in the Air Corps the War Department wishes men.

Duties of this designer are to perform the highest grade of general layout, detail drafting and checking on major assemblies of airships, balloons, engines and various mechanical and electrical accessories and equipment; to design minor parts; to supervise draftsmen of lower grade.

Applicants should at once apply for Form 2600, stating the title of the examination desired, to the district manager, Sixth U. S. Civil Service District, Government Building, Cincinnati; to the secretary, Board of U. S. Civil Service Examiners, Wright Field, Dayton, or to the secretary, Board of U. S. Civil Service Examiners; postoffice at any of the following places: Ohio: Akron, Ashtabula, Athens, Chillicothe, Cincinnati, Cleveland, Columbus, Dayton, Ironton, Lima, Mansfield, Marietta, Portsmouth, Sandusky, Steubenville, Toledo, Youngstown, Zanesville. Indiana: Angola, Bloomington, Evansville, Fort Wayne, Hammond, Indianapolis, Jeffersonville, La Fayette, Marion, Muncie, Richmond, South Bend, Terre Haute, Valparaiso, Vincennes. Kentucky: Ashland, Bowling Green, Covington, Henderson, Hopkinsville, Lebanon, Lexington, London, Louisville, Middlesboro, Paducah, Paintsville, Somerset.

Applications must be on file at the office of district manager, Sixth U. S. Civil Service District, 403 Government Building, Cincinnati, Ohio, not later than October 11, 1930.

FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ENGLAND

[G. KENT]

Preparations for Schneider Trophy Race.

LOOKING forward to next year's Schneider Trophy Race, the British Air Ministry has begun a series of experiments at Felixstowe, England. These experiments or tests will include no attempt upon the speed record but will be devoted to the collection of scientific data, such as can be satisfactorily obtained at lower speeds with models in a wind tunnel. Facts so obtained will be placed at the disposal of the individual or group undertaking the preparation of the British entry.

An official entry is extremely unlikely in view of the extreme costliness of the undertaking and the belief that it is improbable that the planes which competed last year will attain a higher speed next year.

In these tests being conducted, the three most recent types of high speed seaplanes are being used. The Gloster-Napier which took no part in last year's race although it was prepared for it, and the Supermarine Rolls-Royce, which won the race and set up the new speed record of 357.7 miles an hour, are both being flown in varying conditions and at different speeds in order to check scientifically the theoretical assumptions underlying their design and construction. The third type is the Supermarine Napier, which in 1928 raised the record at Calshot to 319.57 miles per hour. This machine has been reconditioned at the works of Vickers, Ltd.

A large amount of information was collected last year during the preparations for the Schneider race at Calshot. A research official was attached to the British team for the first time on that occasion, and the beginning then made is now being followed up with considerable elaboration. No important alteration has been made in any of the machines although some attention has been given to the engines. Modification in the Rolls-Royce R. engines are said to have resulted in raising the horsepower from 1,900 to 2,000. The Napier Lion engines are also reported to have attained higher efficiency.

The Problems of Airplane Noise Studied in England

SUBURBAN residents who live near aviation fields are the same the world over. Recently the objections of suburbanites near London have occupied columns in the London press. The British Air Ministry, while not ignoring these protests, is calmly carrying out its program, which calls for a ring or aerodromes around the city of London and several landing fields within the city itself. The contention of the air officials is that airplane noise cannot be eliminated but can be reduced, and they have set to work to standardize airplane noises, citing noises for all types of planes, and describing what can be called unreasonable noise.

The use of silencers is feasible when applied to the smaller units. The system applied to the greater is large and cumbersome. Moreover, the engine is not the sole offender. The propeller makes a din of its own and its contribution is more persistent and penetrating than that of the actual exhaust, while the combination of the two and the air rushing past fuselage and wires all contribute to the total. The only possible remedy at the moment seems to be the willingness of the pilots to fly at a height which will measurably reduce noise, and it is pointed out that Air Ministry regulations exist which definitely forbid flying over congested areas and impose penalties for such offenses.

The possible way out of the dilemma for the immediate present at any rate is that being adopted by the Air Ministry. Tests are to be made with aircraft of various types at different altitudes. When the noise becomes tolerable that altitude will be fixed as standard for that particular type of plane, although cloud levels, fog and other conditions will from time to time force departure from any standards. Meanwhile, the construction of aerodromes continues.

RECIPROCAL recognition of certificates of airworthiness has been effected between Great Britain and the Netherlands. The renewal of such certificates is not included in the agreement.

FRANCE

Mlle. Bastie Sets New Endurance Record for Women

MLLE. MARYSE BASTIE apparently broke the world's non-refueling endurance record for women at Paris, France, September 4, when she completed a flight of thirty-eight hours. Mlle. Bastie's mark exceeded by two hours, thirteen minutes and five seconds the record of thirty-five hours, forty-six minutes and fifty-five seconds established by Mlle. Bernstein, May 2. Mlle. Bastie formerly held the record of twenty-seven hours, which was broken by Mlle. Bernstein. The flight on which the present endurance record for women was established by Mlle. Bastie was her fifth attempt to regain the record lost to Mlle. Bernstein.

THERE were 588 aircraft in operation on scheduled routes by air transport companies in France July 1, according to a recent report. This represents an increase of twenty-four planes over the number operated by these companies on January 1. There were 993 aircraft in use for civil aviation by schools, aircraft manufacturers, and private companies and individuals, according to an unofficial report.

THE appointment of six Air Attaches has been made possible by the credit of 1,150,000 francs (about $46,000) available in the budget of the current year for attaches, according to a recent announcement of the French Air Ministry. These Air Attaches will be sent, respectively, to Washington, D. C., U. S. A.; Rome, Italy; London, England; Madrid, Spain; Lisbon, Portugal, and Peiping, China. They will have the same status and authority as military attaches and will be under the supervision of the French Ambassador at their respective posts.

GERMANY

[E. P. A. HEINZE]

Soaring Competition of the Rhoen-Rossitten Society, August 9-24.

THE eleventh annual soaring competition organized by the Rhoen-Rossitten Society, held in the famous hills of the Rhoen, in Germany, August 9-24, suffered from adverse weather conditions. Nevertheless, considerable progress in the glider movement was again evident, especially with regard to young fliers. Unfortunately, a number of new machines, destined originally to take part in the meeting, were not completed in time, while others arrived too late to participate officially. Among the latter was the "Fafnir," designed by Lippisch. This machine has a high cantilever wing with a sweepback along the leading edge of the wing, which has a sixty-two-foot span. Another interesting machine was a new one designed by Kuppers for Kronfeld, the well-known Austrian sail-flier and gliding teacher. The wing span of this machine is 98.4 feet.

Some good performances were made during the meet. Kronfeld, on his old record machine, *Vienna*, broke his own long-distance record by accomplishing a flight of 161 kilometers, which is a few yards longer than 100 miles. This machine has a high wing with a sixty-four-foot span; an area of 172.3 square feet and a length overall of twenty-three feet. It is the same one that performed so well in England this summer. A few days previously, Kronfeld had made a similar flight, failing by about one mile to beat the previous record.

Several machines competing in the duration contest stayed aloft for many consecutive hours. Van Hussen remained in the air eight hours and thirty-seven minutes on August 17. He used a two-seater plane "Poppenhauser" with a span of 47.9 feet; length, twenty-three feet; and area, 247 square feet. Other pilots on this day were able to stay up more than six hours.

Trial Flights of Do.X

TRIAL flights of the Do.X, powered with water-cooled Curtiss Conqueror engines are progressing satisfactorily and have been practically completed. The crew of ten men has been selected and demonstration flights throughout Europe are planned. The furnishing of the passenger

compartments has been completed by Messrs. Keller and Company, of Zurich, Switzerland.

In the bow of the passenger deck from which it is separated by a bulkhead, is a compartment containing the anchor winch, 328 feet of steel cable, and a patent anchor weighing 396 pounds. Behind the bulkhead is a small barroom furnished with built-in cupboards; and a smoking room provided with electric lighters and good ventilation. Bar and smoking room are separated by a door from the rest of the passenger quarters, which will accommodate seventy persons. Behind the smoking room are two cabins, one of which can be converted into a bedroom. The doors and the lower halves of the walls are of mahogany, and the upper halves are lined with cloth. Carpets and curtains are provided. Behind these two rooms is a transverse passage leading through doors to the stub wings, from which the ship is entered. From this passage, which is separated from the passenger rooms by a door, a central passage leads towards the tail of the machine. This passage is flanked at its beginning by cloak rooms and leads into a salon twenty-three feet long and ten feet wide. Behind this room are several small cabins and an electric kitchen, lavatories and luggage rooms.

THE Junkers Company, of Dessau, report that their branch office for air surveys at Lima, Peru, has received orders both from Peru and Bolivia for aerial photographic surveys of large tracts of land in those countries.

AIR taxi operations are increasing in Germany. At Bremen, the Norddeutsche Luftverkehr Company has been founded expressly for this service. The company, during the first two months of its existence, completed 106 paid flights, during which 251 passengers were carried to their destinations without accident. The company is using a single new Focke-Wulf plane of the "Sperber" type, which has been expressly developed for this service.

THE German combined airplane and steamship mail service to South America is reported to be working exceedingly well. Mail from Berlin to Rio de Janeiro is about eight days on the way.

THE JUNKERS COMPANY, referring to the United States laboratory tests carried through with the object of establishing the degree to which various types of airplanes are proof against lightning, criticizes the reports of some newspapers which stated that "even metal planes are lightning proof." The company draws attention to the published results of an investigation carried through some time ago by the German scientist Dr. Heinrich Koppe, who, in a German scientific aviation paper, wrote that a metal plane, in which all metal parts are well-connected, is the least vulnerable to lightning since the metal parts form a kind of Faraday cage.

CONSTRUCTION of the new German Zeppelin is making fairly good progress. The new shed has been completed for some time and the setting up of the rings has already begun. According to the latest plans, the passenger cabin is to be included in the body of the ship. The front cabin will be smaller and reserved solely for the navigation of the ship, which, it is estimated, will start on its trial trips during the summer of next year. The *Graf Zeppelin* has undergone certain modifications. A new car added immediately behind the passenger cabin contains a motor coupled with a generator for the supply of electric current to the ship. The old propeller-operated generators were found inadequate as they did not supply sufficient current when the ship was going slowly.

A new airship shed will be erected next spring at Lowenthal, near Friedrichshafen. This shed is to serve principally as a transport station, and it will be nearly as large as the one at Lakehurst, N. J., U. S. A.

SWEDEN

A FREE trip to Paris by air will be given to the 75,000th passenger by the Swedish Aerotransport Company in commemoration of the event. Who the person will be is not yet known, but he will soon be identified, as the total number of passengers carried closely approaches that figure. Over a million miles have been covered by the company with one hundred per cent safety.

During the past season the increase in traffic has been particularly great on the route across the Baltic between Sweden and Finland, the journey by air being made in a few hours as compared to an all-day and all-night trip by boat. The increase in passengers carried over last year has been sixty per cent. A total of 1,782 passengers had crossed the Baltic by air from Stockholm to Helsingfors and return up to August of this year.

The air-mail route to the European capitals, by which either London or Paris as well as Berlin may be reached from Sweden, or vice versa, in one day, has shown gains this summer. Most of the passengers are either Swedes or Amerians, the latter accounting for fifteen per cent of the total.

The next development in aviation in Sweden now being planned is regular night air mail service. So far, this has been tried during the summer months only. The average load has been 700 kilograms of letters each night, the service having proven popular. Captain Carl Florman, director of the Swedish Aerotransport, plans to develop a passenger line to the north of Sweden from Stockholm and a night mail line from Stockholm and from Oslo in Norway, via Gothenburg in Sweden, to the European continent, so that letters mailed in these cities in the afternoon will be delivered in Paris, London or Berlin the next morning.

DUTCH EAST INDIES

THE K. N. I. L. M. service of Lynx-engined Fokkers recently completed eighteen months of service in the Dutch East Indies. During this period the planes flew 4,849 hours, covering a distance of 484,900 miles. A total of 21,703 passengers was carried, 203,983 pounds of express, and 9,784 pounds of air mail.

MEXICO

[M. HURST]

IN Answer to the government's insistence that Mexican pilots be given preference in civil employment, various airlines of the republic have answered that there are not enough Mexican pilots to fill the requirements. The government will take steps to stimulate interest in civilian flying.

BY presidential decree a tax of from five to twenty pesos daily is charged foreign airplanes making sight-seeing or business trips to Mexico. The amount charged depends on the number of passengers carried by the plane.

THIRTY civilian pilots have completed their studies in theory and practice in the Civil Aviation School and have been graduated. They recently received their diplomas from the Sub-secretary of the Department of Communications.

BY order of the war and marine department the Mexican government will maintain seventy airplanes on the border of the republic. Thirty will be for army aviation service and the remainder for use of pilots and students of army flying schools.

PLANS for the establishment of an airline between Oaxaca and the banana plantation region of Tuxtepec are being made by the Cia. Nacional de Aviacion. Inspection flights by representatives of the aviation company have been made.

CANADA

THE new plant of Fairchild Aircraft, Limited, including landing field and seaplane base, at Montreal, was formally opened September 5, according to a recent announcement of Ernest Robinson, vice president of the company.

"Built as a result of the progressive increase of the company's business with the Canadian government, firms and individuals, the plant is fully equipped to assemble, test, service, repair or rebuilt all makes of airplanes or seaplanes, although, of course, its principal use will be for the Fairchild line," Mr. Robinson said.

The factory is situated in the northwest corner of the airport, which is fifteen minutes from Montreal. The factory building, a few hundred feet from the seaplane harbor, is of steel and brick construction and contains 38,000 feet of floor space.

The Fairchild airport is a non-commercial field with four runways 200 feet wide and varying in length from 1,800 feet to 1,950 feet. The adjoining seaplane base is formed by a natural harbor on the south side of the St. Lawrence River. On the top of a point of land extending along one side is a paved road connecting the extreme tip with the factory and a main highway. A slipway on which seaplanes can be beached is provided.

(Continued on next page)

(*Canada News continued*)

A SURVEY of the airports in Canada has been completed by the United States Department of Commerce. Regular service is maintained over nearly 7,000 miles of airways, some of which are lighted while irregular flights are made in the services of numerous industries, according to the report. Vast areas have been explored and surveyed from the air. Air patrols over large forest tracts save a considerable amount of timber from destruction by fire, as compared with losses prior to the provision of this form of protection.

There are twenty-two flying clubs in Canada, each operating two or more planes from its own or from some nearby airport. On March 31 of this year, civil certificates were effective in Canada for 370 private pilots, 370 commercial pilots, 311 air engineers, 407 aircraft, and seventy-one airports.

Not all the airports and seaplane stations have been licensed, according to the report, about 125 being included in the survey. There are numerous others for which descriptions were not available. The many lakes and streams of Canada offer facilities for seaplanes or amphibions during part of the year; many of these are utilized by ski-equipped planes during the winter months. Caches of fuel and oil have been provided in places where planes on some one of the several types on private or public missions may need new supplies.

Canada Utilizing Planes for Aerial Surveys and Forestry Patrol

J. Montagnes

TWENTY-SIX Royal Canadian Air Force airplanes, working in thirteen detachments, are now engaged throughout Canada in aerial photography and surveying for the Canadian Government.

For the past few years Canada has been engaged in the work of taking photographs from the air for maps and making aerial surveys of large areas of practically unexplored territory. This year's program of such work has the largest aerial photography fleet ever employed in Canada. Before the end of the season probably at least another hundred thousand square miles of country will be surveyed from the air.

As in recent years the Forest Service of Canada will continue to carry on the work of forest fire protection in the provinces of Manitoba, Saskatchewan and Alberta, for the season of 1930, and for this purpose has arranged to continue the coöperative arrangements which it has had in the past with the Royal Canadian Air Force. In these three provinces the area over which the air patrol work is carried on approximates 100,000,000 acres, of which a large portion is unmapped. For this purpose twenty-one seaplanes and flying boats will operate to detect and suppress forest fire outbreaks. These machines will be capable of carrying greater loads than in other years and their better performance should add greatly to the efficiency of fire-fighting operation.

Of the thirteen detachments engaged in aerial photography and surveying one is operating in British Columbia; one in Alberta; four in Manitoba, Saskatchewan, the Northwest Territories; four in Ontario and Quebec; one in the Maritime Provinces; one has been assigned to special transportation work such as carrying surveyors, explorers and other officials into inaccessible regions; and another to the exploration and photography of the main aerial routes in the Far North. The experience of the last few years has shown that at least for many years aerial transportation will be almost the sole means of communication throughout these vast and little-known areas. The exploration of safe flying routes is regarded, therefore, as one of the first considerations towards opening up this country.

PERU

[H. Gomez-Cornejo]

Air Transportation Opening Vast Remote Territory in Peru

THE airplane service which was established August 14 by the Peruvian Naval Air Line from Pacasmayo to Celendin, Balsas, Chachapoyas, Moyobamba and Balzapuerto, connecting with the already established airline from Iquitos to Yurimaguas and Balzapuerto, has opened up to civilization vast forest regions in Peru.

Under the leadership of Commander Harold B. Crow, Inspector General of Peruvian Aviation, a net work of airlines is being woven between the capital and the commercial seaports of the Pacific, and linking them with the river metropolis from that port to Para and Manaos in Brazil. During the past two years a great amount of pioneer work in aviation has been carried out in Peru. Peruvian Naval Air Line pilots have explored and seen for the first time tens of thousands of square miles of territory virtually as little-known as that of the Antarctic. Now the secrets of the resources of such regions as the Pampas de Sacramento and the Gran Pajonal are falling away before the airplane, field glasses and camera. Lonely clearings and outposts have been brought as close as Lima and Tacna or Puerto Pizarro; and airports and seaplane bases are being established from the coast to the Amazon jungle lands.

The Peruvian Naval Air Lines will carry mails, passengers and freight from San Ramon (reached by rail and motor car from Lima) over the eastern ranges to Masisea, down the Ucayali to Iquitos, up the Marañon, Huallaga and Mayo rivers from Iquitos to Yurimaguas and Moyobamba in connection with the already established airlines between the coastal city of Pacasmayo to Moyobamba.

Pacasmayo being on the Pacific Ocean and 740 miles north of Lima, the new Peruvian Naval Air Line, will cut across the Andes at the low altitude of 1,150 feet, with landing fields at Cajamarca, Celendin and Chachapoyas. Boeing 40 B-4 biplanes powered with 525-horsepower Pratt and Whitney Hornet engines have been selected for use on this line. Prior to establishment of the regular mail and passenger air transport service, a Vought Corsair and a Stearman biplane, in charge of Commander H. B. Grow and Capt. Ergasto Silva, left for Pacasmayo and Chachapoyas where they arrived after a stop at Cajamarca, in five hours and forty minutes, establishing a record between the capital and that town.

What the air mail and passenger service will accomplish in the way of saving time, as compared to other means of transportation is shown as follows: Pacasmayo (port) to Cajamarca, by train and automobile, nine hours, by airplane, twenty minutes; Cajamarca-Celendin, by mule and automobile, twelve hours, by airplane fifty minutes; Celendin-Chachapoyas, by automobile and mule, five days, by airplane fifty minutes; Chachapoyas-Moyobamba, by mule and on foot, eight days, by airplane, fifty minutes. Thirteen days and twenty-one hours of travel over the western Andes, down into the 8,500-foot canyon of the Marañon over the eastern Andes, and thence through the mountains and jungle country to Moyobamba will be reduced to two hours, twenty minutes actual flying time by airplane.

VENEZUELA

CONSTRUCTION of the first civil landing field in Venezuela has been authorized by the government of Venezuela. The field contains approximately 1,190,000 square yards and is located north of Laguana de Valencia on the Maracay-Valencia highway. Facilities for the servicing of landplanes and seaplanes will be maintained. Two hangars will be constructed, one for landplanes and one, situated on the lagoon, for seaplanes and amphibions. Each of these hangars, which will be of steel construction, will be twenty-seven feet wide, forty-four feet long, and nine feet high, and each will be provided with a repair shop.

Scope of First Civil Aviation Law

AMONG the provisions of the first civil aviation law recently passed by the Venezuela Congress are the appointment of the Superior Board of Aviation which will formulate aeronautical legislation; the regulation of aircraft flying over Venezuela; classification of airlines; and the control of airports.

This law governs everything pertaining to civil aviation, including commercial and private flying. Venezuelan aircraft may be operated only under general or special permits issued by the Federal Executive. The government reserves the right to permit or refuse passage to national or foreign aircraft alighting on land or water within its territorial boundaries; and may suspend the traffic of aircraft or indicate routes and landing places whenever it deems such measures necessary. Infraction of this regulation may bring confiscation of the aircraft, and a fine of not more than \$3,860 and not less than \$96. In case of war, the government reserves the right to confiscate any aircraft. Contracts of air navigation may be entered into with the government for a period not exceeding ten years. The internal services in Venezuela may be reserved for Venezuelan aircraft without any obligation to any foreign company.

"A SWEEPING VICTORY *for* Monocoupe"

Summary of Events—*National Air Races*

Chicago, August 23 to September 1

MONOCOUPES placed first in 11 of the 15 events in which they they were entered, including both open and closed type planes and were in a power class of from 275 to 800 cu. in. engine displacement.

MONOCOUPES placed second in ten of these events.

MONOCOUPES placed third in nine of these events.

MONOCOUPES placed first in each of the three Air Derbies in which they were entered.

MONOCOUPES won 63% of the total prize money offered for the events in which they were entered.

Of the 15 events entered by MONOCOUPES one-third of them were for planes of greater horse power.

THE AIR RACES held at Chicago this year have been responsible for a sizable increase to the already large MONOCOUPE following. Many of the oldtimers have been converted and realize that for real speed and efficiency the MONOCOUPE with its cabin comfort and general high performance qualities represents the last word in airplane design.

There must be a reason! Performance such as shown by MONOCOUPES during the 1930 National Air Races is not obtained by mere coincidence. The speed and efficiency shown by these sturdy little planes are the result of years of manufacturing experience and experimental work and engineering skill devoted exclusively to the production of a light plane giving a maximum of performance with a minimum of power.

All of the MONOCOUPES entered in the various events of speed and efficiency were strictly stock models with the same trim lines and embodying the same comfort as found in all our planes. If you have not flown the new MONOCOUPE arrange for a demonstration today and experience the thrill of super performance and the comforts of flying that only can be found in a cabin plane.

Department of Commerce Approved Type Certificates have been granted to MONOCOUPES powered with Lambert R 266, Warner Jr., Warner 110, and Kinner B5 engines. Top speeds of the MONOCOUPES vary from 120 m.p.h. to 148 m.p.h., depending upon the power plant used.

Prices from $3375.00 to $4500.00 fly away Moline

MONO AIRCRAFT CORPORATION

MOLINE, ILLINOIS, U. S. A.

AIR—HOT AND OTHERWISE

(*Continued from page* 49)

will tend toward efficiency, extension and improvement, and will benefit the United States both directly and indirectly.

We of Aero Digest find the indirect benefit most impressive, for it will consist of the development in every sense of the vast regions to the south of us, giving South America the first real chance it ever has had. It has not been human inefficiency, as many writers seem to have assumed, which has kept the political, commercial, agricultural and scientific development of South America to a pace slower than our own.

The more rapid progress of civilization and the speedier march of material progress in North America has not been wholly the result of the mental superiority of the original settlers or their successors, though we all like to believe that it has been. Without the railway in superlative development, the North America we know would have been utterly impossible. During recent generations the motor car has made immense contributions to our ease of surface communication, along the lines of which have lain many obstacles, of mountain, desert and vast watercourse; but none of these has been as great as the impassable Andes, as the incredible Amazon and Orinoco, or South America's vast arid wastes. The same manner of human beings went at the start to South as to North America. But the tools with which, up to this moment, they have worked down there, have been possibly less effective with the far greater tasks which they were called upon to do or fail.

That in the matters of material development, and therefore of wealth-creation, South American nations have not kept pace with the United States and the Dominion of Canada has been very largely because of their inability to solve the transport problem. Not even our Huntingtons and Hills and Goulds and all the others could have solved that which has confronted them. South American surface transport has been a problem utterly beyond solution. So it is not unlikely that the historian of aeronautics a hundred years from now may declare that of all regions of the world South America has profited most by air transport during the century upon which he will look back.

South America has been bisected by its natural geography, longitudinally north to south. Such a linking of east coast to west as has occurred in the United States and Canada has been impossible among our Latin-American neighbors. Chili, Peru and Ecuador are not merely separated by distance from the countries which debouch upon the Atlantic and Pacific. So far as transport-communication, or wire telephonic and telegraphic communication goes, there is nothing analogous in the conditions maintaining between the Atlantic and the Pacific regions of South America and the Atlantic and Pacific regions of North America. Exchange of commodities between them has been either by ocean around the incredibly distant and difficult Cape Horn, or by ocean to and through the Panama Canal, and by ocean again to some port from which the ultimate destination can be reached. Even South American international commerce has been hampered by bad transport.

Transportation is the primary influence in the spread of civilization. North America has had transportation and, in certain senses, has gained civilization, though, Heaven knows, certain details remain in which we lack it. Lack of quick and efficient transport and communication has rendered impossible for South America any real entrance into the industrial age and all that that implies to commerce, utilization of natural resources and that demand for mass-education which becomes irresistible in a nation wherein only the existence of intelligently trained technical workers can assure a continuance of progress and prosperity and, therefore, will be sure to take advantage and utilize for the benefit of themselves and their industrial leaders the discoveries and creations of mechanical science.

North America owes all its rapidity of economic progress and a very large proportion of its social advance to quick transport. This South America never has had before and never could have had without the airplane.

Now she is going to get it, and under the management and leadership of men who have been trained in the immense school automatically created by North American progressiveness and achievement.

Much of South America came under the influence of white men as soon as, or before, they made a deep impression upon North America. But that matter of difficult transport has been a stumbling block. Now that it has been removed by the only means which could remove it, we may see things which will seem almost magical in South American development. It is fortunate for the United States that the leaders of the system which will thus affect the nations to the south of us are North Americans and not of those European nations which, so far as ocean transport could permit, have shown a greater appreciation of South American possibilities, thus far, than we have.

From the party which for the National Geographic Society is making an aerial survey from New York to Buenos Aires comes back a report signed by Frederick Simpich, a man of an inquiring mind which notes important matters.

"From New York to Buenos Aires, today," he says, "is strung a line of American boys in overalls. Seaplane pilots, mechanics who are sharpshooters with grease-guns, radio operators, agents and ticket-sellers. It takes a small army of trained men to operate this long-distance service. Already seaplane patrons and crews have so increased business in hitherto remote towns that new or remodeled hotels are being discussed. From San Juan de Porto Rico to Para and Pernambuco, hotel managements have become accustomed to that joyousness which comes with the sight of sunburned, khaki-clad flying Yankees trooping in for lunch after having suddenly appeared from Heaven knows where to northward. In one day the mail plane pilots make anywhere from 1,200 to 1,500 miles, eating breakfast in Miami and dinner in Hayti; or perhaps they sleep tonight in Para, Brazil, and tomorrow night in Port of Spain, Trinidad."

The thought of Buenos Aires to Miami in six days and a half has suggestions of the magic carpet in it. That will be the schedule time in which mail and passengers may make it if they wish.

The development of this all-American service does not come too soon. European mail from Sao Paulo already is being transported by the existing line from Buenos Aires to Natal. The new service will handle mail to and from America only. It is time for it to be established and it has been established splendidly in time.

But those who have the interests of air and of the public energetically in mind must not let that mind relax now that this is an accomplished fact.

And we of the air industry have ahead of us for the immediate future another even bigger and more noteworthy task. We must not forget the great domestic air mail objective. Every ounce of mail that in the United States, itself, travels between addresses separated by more than a hundred miles *must be transported by Air Mail* AND AT THE TWO-CENT RATE. After this is an accomplishment, as the great Pan American hook-up is now a finished job, the time will not be very distant when we shall begin to think about all foreign mail by air—and at the five-cent rate.

TRANS-ATLANTIC WEATHER

(*Continued from page* 36)

fund of expert information. Remember, these observations were gathered free of expense and by willing volunteers. Much of the Radio Corporation's work was done without charges. The Weather Bureau, of course, was glad to coöperate and take on the extra task.

In the midst of these hectic weather news-gathering days, Colonel Lindbergh arrived from the Coast in the *Spirit of St. Louis* and joined with the Byrd and Chamberlain expeditions in the benefits from our ocean service. It provided the reports for all three expeditions, and the fliers on returning told us gratifyingly how the conditions bore out the prophecy. Chamberlin expected to find a low area off Ireland. We suggested that he go around it to the south. He did just that, picked up the *Mauretania,* took a bearing from her wake and in spite of poor visibility hit Lands End on the nose and then took another bearing and flew on to Germany. In my opinion it was perhaps the finest meteorological air navigation by dead reckoning of the year.

The service was continued for Brock and Schlee and for the George Haldeman-Ruth Elder expedition. It was dropped then and picked up again last year for the Williams and Yancey and the Loti, LeFevre and Assolant trans-Atlantic expeditions. Interest in trans-oceanic weather for flying resulted also in an appropriation for the continuance of such a service, and so this year we are gathering reports twice a day from twenty ships for our North Atlantic Weather Charts.

In a later article I shall go into greater detail on the way in which the reports are gathered, the bits of information by which general facts are deduced, the element of error we may expect and something of the significance in relation to the whole air transport picture. Before closing, however, I want to state emphatically that the Weather Bureau is heartily against "stunt" flights of the hair-brained variety. It is often astonishing how many persons call us up or come in to see us equipped with nothing more than a desire to fly the ocean and sometimes nothing but the desire for spectacular publicity. Opinions differ widely as to what constitutes a stunt Atlantic flight, and the definition changes from year to year, but we find many clear thinkers in aviation who now assert that a project lacking in any of the following is a stunt:

(1) A well conditioned plane having a flying radius twenty-five per cent in excess of the ocean hop; and a crew of two.

(2) A pilot who can fly blind, unperturbed in fog and who has had night flying over water.

(3) A navigator who can quickly check his course and instruments astronomically.

(4) A radio operator who can converse freely with other operators.

The Lindbergh flight was probably the most spectacular performance we shall ever see, but it was more than a stunt with its careful preparation and the business-like efficiency in which it was carried out. Also, it was a pioneer venture. Chamberlin and G. M. Bellanca had been planning a trans-oceanic flight for five years, and they prepared slowly and carefully, testing their plane in a world's duration flight before starting out. The Byrd expedition was the result of most careful planning and months of research. Others have gone about the task with equal attention to details and ocean flights are likely to continue until the day arrives that Colonel Lindbergh expects when the continents will be linked by trans-oceanic air transport.

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Seven aviation concerns are already operating 12 daily scheduled lines in and out of Fort Worth with 24 planes, carrying capacity of 216 passengers, covering 20,000 miles daily.

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Government Radio and Weather service is maintained.

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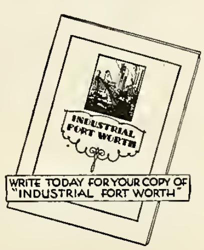

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AMERICAN OPTICAL *Company*

SOUTHBRIDGE, MASSACHUSETTS

WITH THE FORD TOUR

(*Continued from page 60*)

less than nothing flat. Stores and schools had closed at Moose Jaw, as at several other cities along the route, to let everyone see the planes. Moose Jaw people told of their flying club of 250 members, with thirty-four active students, and Boeing and Fokker planes in the big hangar suggested the air mail service that connects the southern Canadian cities.

North Battleford and Saskatoon turned out big crowds, but it remained for Edmonton to set the high mark for enthusiasm.

The tourists will remember Calgary because a tail wind —the first on the cruise—speeded them over the 175-mile course from Edmonton in about an hour, and for the dedication in the evening of the great beacon on the Hudson Bay store, one of several which that company is erecting throughout Canada as its contribution to the development of aviation.

Lethbridge, the final stop in Canada, and Great Falls, and then the mountain crossings, with Sheridan entertainers providing a novel chuck wagon luncheon for the next noon stop. There Nancy Hopkins showed the dude ranchers how well she could ride a horse. At Cheyenne the tour planes landed on the field being so elaborately developed as a center of operations of the Boeing lines. At Denver the municipal airport with its four runways 4,000 to 5,000 feet in length showed that thin air is not to prevent take-offs in the Mile-High City.

By way of summary, then, the National Reliability Tour of 1930 stands out for these things: Its reality as a race; the high speed of the big planes; faster small planes, notably the Monocoupe, which with the new Lambert 90 engine was twenty-five miles faster than last year; the interesting new types of ships represented by the twin-engined Kingbird and the Sikorsky amphibion; and the good-will engendered by the Canadian excursion.

PRINCIPLES OF AERODYNAMICS

(*Continued from page 57*)

D the diameter. They are not proportional to the area times the square of the r.p.m.

As our discussion progresses, we shall become acquainted with the experimental facts of which aerodynamics is a systematic digest, and learn when the square law holds and when not, and how far it holds. In this article we shall explain how the aerodynamic engineer applies the square law with the least effort. This is done by the use of similar quantities.

Although I never met the man who put "efficient" into "coefficient," I admire him for his clever use of the term. Instead of dividing and multiplying with pairs of squares, the engineer divides the air force when he first meets it, excluding everything that is not essential but only accidental to the experiment, of the particular scale, velocity, and also of the air density. The resultant quantity is universal. It can readily be compared with similar quantities, even with those found in other allied sciences and in other media, such as water. Aerodynamics and hydrodynamics, air forces and water forces, have and should have the same coefficients.

That is not all; the advantage of using coefficients is much greater. The geometric dimensions, the velocities and the density are the physical quantities giving rise to the square law. Bernoulli's law shows that the product of the velocity square times density is a pressure. This pressure

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multiplied by an area is a computed force. We form genuine coefficients by dividing air forces by that combination, and in doing so we form coefficients by dividing a measured force by a computed force. A genuine coefficient is therefore a pure ratio of two forces, the ratio of two things of equal kind, and therefore has a direct and easily conceivable meaning. The coefficient itself, its numerical value without reference to any units, means something; for example, if one article costs twice as much as another, this value has its distinct and complete meaning, without reference to dollars or shillings. The genuine coefficients come out equal if computed by the same general rule, no matter what units of length, etc., have been used, provided all have been measured in consistent units. Coefficients are international and independent of national units, such as the British or metric system.

Even that is not all. The procedure followed is so direct and rational that the resulting ratios come out (automatically and with reasonable magnitude) in the neighborhood of ONE and not consistently different from it, but between 1/100 and two in most cases. For all these reasons it has become common to apply the term "coefficients" to only such values as are actually the ratio of physical quantities of the same kind. Coefficients have no physical dimension, and do not depend on the units used consistently. All other quantities of similar description, but from which accidental conditions, impure coefficients and half-coefficients have been only partially eliminated, are called "moduli."

Of the innumerable methods used to obtain true and genuine coefficients, two have attained prominence in aerodynamics and are still in use. The more primitive way is to divide the air force by the density, the square of the velocity and the square of some characteristic length—that is, some area. It is more ingenious and engineering-like to divide by the area and by the dynamic pressure. The resulting coefficient then proves to be twice as great as by the former method, because the dynamic pressure contains the factor "one-half." This larger coefficient gives the simplest and most direct theoretical relations and gives experimental values closer to ONE. It was originally used in France and Italy. Later, I was influential in introducing it in Germany and America, in both of which countries it has been adopted. It has in consequence become more common than the more primitive coefficient, and it is hoped and expected that it will some day be universally adopted.

We often encounter the expression "absolute coefficient." That is like speaking of a "round circle." No true and genuine coefficient is more absolute than another. In practice, this "absolute" is very vaguely used and with different and indistinct meaning, if it has any meaning at all.

Although coefficients are more perfect than moduli, they are not always more convenient for special purposes. They are the best general tool, but not the best special tool. Sometimes, it saves time in computations to divide the air forces by V^2L^2 only—that is, to leave in the density. In other cases, it is practical to divide by the dynamic pressure only and leave in the area. That allows direct additions in special cases. The air force divided by the dynamic pressure gives, nominally, an area. The resulting value depends on the unit used for the measurement of the length, and should be called an air force area. It is a computed area—namely, the area which gives the air force in question in combination with the coefficient ONE. This is

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distinctly a modulus—not a coefficient. There is a time to use coefficients and a time to use moduli. The only requirement is that we know which to use.

It is impossible at one time to utilize the advantages of the universality of coefficients and the specificness of moduli. In spite of this, U. S. Army engineers try to get both at the same time by calling the modulus they are using a coefficient. They call it "absolute coefficient," probably to stop any contradiction in the term. That is like the Scotchman who tried to combine the advantages of having a son and a daughter by naming his baby girl "Robert." The U. S. A. values are not absolute. Absolute means freed of limitations, and these units are neither freed of inconsistencies of the units used nor of the density adopted as standard. As a matter of fact, I have never seen anybody use the U. S. A. values without a slide rule in his hand. Multiply the U. S. A. values by the figure 391, discussed in the third article of this series, and you will obtain the standard coefficients.

The coefficients play a dominant part in all aerodynamic computations, and no effort should be saved to become entirely clear about them. They are constant (or nearly so) under similar conditions. Take the lift L. The standard lift coefficient is denoted by C_L and is defined by

$$C_L = L/(SV^2\rho/2)$$

where S is an area (ordinarily the simple wing area; not top and bottom added) and $V^2\rho/2$ is the dynamic pressure. For instance, let L be 2,000 pounds and S be 200 square feet, V 100 miles per hour and the density correspond to sea level condition. $V^2\rho/2$ is then $100^2/391$ and L/S is the wing loading, $2{,}000/200 = 10$ pounds per square foot.

$$C_L = \frac{2{,}000}{200(100^2/391)} \text{ or } \frac{2{,}000/200}{100^2/391} = \frac{\text{Wing loading}}{\text{Dyn. pressure}} = .39$$

For practice, compute the lift coefficient for a weight of 2,500 pounds, a wing area of 189 square feet and a velocity of 120 miles per hour at sea level. Do you get .36?

The air force is computed from the coefficient by reversing the process, multiplying it by the area and by the dynamic pressure.

$$L = C_L S\ V^2\rho/2$$

All this does not require particularly high mathematics. Some multiplication and dividing is all.

The drag coefficient C_D is similarly computed from the drag as the lift coefficient from the lift.

$$C_D = D/(SV^2\rho/2)$$

The S is either the wing area, or some other area, as will be discussed later. The center of pressure, in per cent of the chord, is also a coefficient, but it is never called a coefficient. The moment coefficient is computed by dividing the moment by a computed moment. This is the product of the dynamic pressure by a volume; viz., the product of the wing area and the wing chord c:

$$C_M = M/(ScV^2\rho/2)$$

All these standard, "full-grown" coefficients are written with a capital C with another capital letter attached to it saying which coefficient is meant. The "half-grown" coefficients are written with a small c attached to the letter denoting the force meant:

$$Lc = \tfrac{1}{2}\,C_L;\ C_L = 2Lc;\ Dc = \tfrac{1}{2}\,C_D;\ \text{etc.}$$

The old kind of moduli (like the U. S. A.) is generally denoted by k_Y and k_X:

$$C_L = 391\ k_Y \qquad C_D = k_X$$

but only if foot and pound are used.

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The drag area is defined as

Drag/Dyn. Pressure = Drag coefficient times area.

This is not quite the same as "equivalent disc area," because in the computation of the area of the disc having the same drag as the solid in question, the drag coefficient of the disc is assumed to be 1.28 rather than unity. Hence the drag area is 1.28 times as large as the equivalent disc area.

That much about coefficients. In later articles we shall see how large they are and how they are used.

This is the fourth of a series of articles on Aerodynamics by Dr. Munk. To be continued in the November issue. Copyright 1930. *All rights reserved by the author.*

CYDE-LIGHTS ON THE AIR RACES

(*Continued from page 39*)

There was Atcherley, the English representative in the group of International Visitors, a real sporting gentleman of the air, and one of the most accomplished and finished pilots it has ever been my pleasure to watch. His stunt work was sure, smooth and perfect; and his "crazy flying" was a joy to behold. It was the first time that brand of flying had been done in the United States, and it was a riot. He flew a few feet off the ground, stalling and turning contrary to every rule of sane flying,—and got away with it. Perfectly safe, too, because if he'd made a mistake all he'd have done would have been to crack a wing-tip or go up on his nose. I announced for him on that stunt—my first attempt at that business.

Marchal Pietro Colombo, representing Mr. Mussolini's Italy, was an agreeable, jolly little fellow who took his low-powered plane up and did things with it that few of us could do with four times the power. He just went up and casually flopped around the sky. You never knew what he was going into or where he was coming out. He actually did an inverted loop with that plane. I'd like to see that quiet old lad sitting behind five or six hundred horsepower. He's Mussolini's chauffeur, by the way. I suppose Mussolini simply said to him, "Marchal, you go over there and stunt. Don't be worried—the birth-rate is high here, anyhow."

Fritz Loose, representing der Vaterland, had bad luck and damaged his own Junkers plane, after which he borrowed a Great Lakes and a Savoia-Marchetti and put on a very creditable exhibition. He is a very fine chap, and I'm glad now that I didn't drop a bomb on him during the war. Fritz Loose, like Atcherley and Colombo, did no grandstand aviating, but flew exactly where he was told to fly—out over the field and away from the crowds. It was a pleasure to know these fine pilots and good sportsmen.

Marcel Doret, representing France, entertained the crowd with what might be described as an aerial definition of stunt flying—a thing of sound and fury, signifying nothing. His exhibition was 20% skill and 80% noise. The same maneuver performed out over the field (where the race committee requested him to perform it) would have been interesting to watch, and no more than that. Performed over the heads of the crowd, with a roaring motor, it became a highly exciting affair, fulfilling every wish dear to the heart of the grandstanding aviator. Unlike the good sportsmen from England, Germany, and Italy, Monsieur Doret ignored the repeated requests (one could hardly give *orders* to a guest!) that he fly out and away from the stands, and that he use only the time allotted to him. He flew where he was asked not to fly, he overstayed his time in the air, he dived at other planes to their and his hazard, and he calmly ignored the regula-

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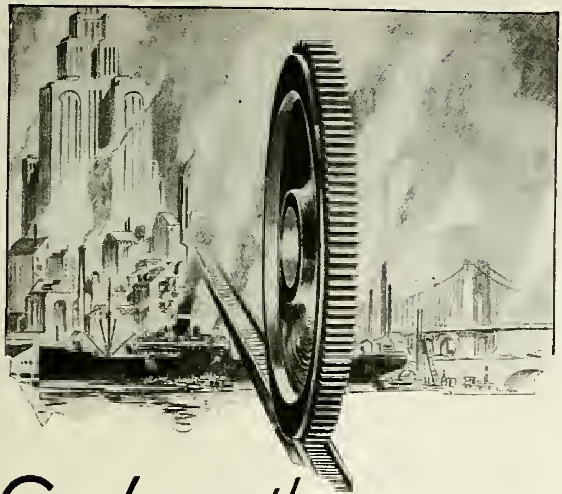
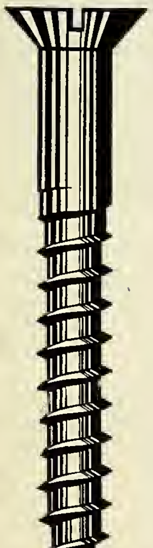


Cogs in the Wheel of Progress



THE wheel of progress moves forward—every accomplishment seems a little larger and a little better than the one before.

But progress is only made possible by carefully made plans and the help of well made materials. A small but none the less important material, a "cog" that allows the wheel of progress to move smoothly forward, is the lowly screw. Its job is to hold construction together. If it is an AMERICAN SCREW, the job will be well done.

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tions promulgated by the United States Department of Commerce for the safety of all.

During the last three days of the races our own Al Williams, who had brought the international visitors here, was asked to go up. He didn't need much urging, for he'd been itching to do it all week—that old bird just isn't happy when anyone else is in the air and he's on the ground. To describe Al's work as stunt flying is inadequate; when he does it, the thing doesn't look like a stunt. You might call it acrobatic precision airmanship—or precision aerobatics. He goes into everything and falls out of nothing, and he's as smooth as a greased eel in all he does in the air.

Oddly enough, he asked me to announce for him, although he knows that I have less than no belief in aerobatics as a helpful factor in aviation, and that I have expressed my opinions freely and strongly. However, there was no call for me to present my personal opinions to that multitude of 75,000, and Al needed someone who could describe his maneuvers so the crowd would know what was in progress. Hence, I sneaked up on the mike again and quavered out my report on the current display, retiring undamaged. Beware, Graham MacNamee! Another leather-lunged announcer of sporting events has hit the air. And these pilots can't fool me the way those cauliflower lads fooled you in that Schmeling bout.

The girls and their rigs—I hear they spent all their prize money on new pants. Talk about the emancipation of women! That's old stuff. What we've got now is the epantsipation of flying American womanhood. Who started it, anyhow? Elinor? Phoebe? Hanged if I know. But there they were, the flying fillies, in every form of pants—and some with no form worth mentioning. The pants, I mean. Two thin ones in those long-legged riding pants—not breeches—bore an odd resemblance to a couple of grasshoppers in full flight, hind legs extended. I asked them where they had parked their horse, and they said they'd come in with Hoot Gibson.

Hoot flew in a race, by the way. He seemed lost without his horse. There's one thing about a horse—you can make tight turns around a pylon on it. When he got to a pylon Hoot could have changed to a horse, made the turn, and got back in the plane and saved time. Then he could have lent the horse to Jack Bridges.

But to rejoin the ladies—I've raised my feeble voice, like a pelican crying in the wilderness, and entreated them to return to the garments of womanhood. They refuse to do it. I tell them they don't look good in pants. They say neither do I. I'm just where I was a year ago—they pay no attention to me—most of them are married and have a hearty contempt for the male sex anyhow. Little Elinor Smith, now—I used to say she was the only one who could get away with the things. But that praise went to her head. She simply went mad on pants—pantsopathic, medical men term the ailment. Elinor was apparently working as a clothes-model for a firm of pants makers. Every day she appeared in a different colored pair of suede leather limb coverings—all the colors of the spectroscope and a few from the horoscope and the heliotrope. I only hope the dyes didn't run, or she'll have to lie out on some roof to bleach. Of course, she looked cute—but maybe I'm prejudiced, as I'm her uncle by abduction.

Betty Lund pulled a fast one, but I slowed her down—just to be mean and comfortable. Betty's becoming quite a big figure in female aviation, and she should eschew shorts. But shorts it was—and cute Betty with knees and legs as white as a blonde angel's wings. Obviously, she was

(Continued on following page)

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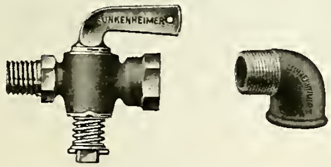

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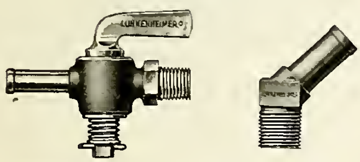

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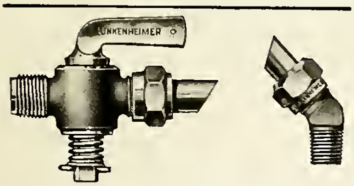

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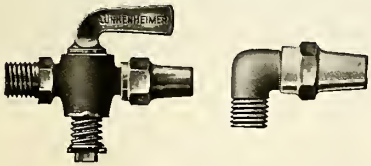

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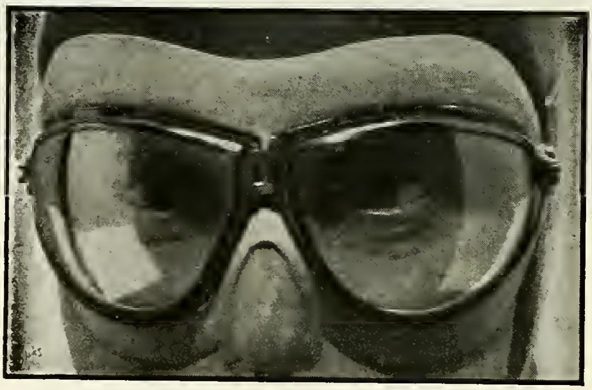

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There is also the Willson Observer, at $10, exceptionally satisfactory in the service for which it is designed. If your dealer cannot supply you with these goggles, write direct to us.

Airports and flying schools find Willson Goggles a popular and successful line. Write for detailed information.

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Aviation Division

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READING, PENNSYLVANIA

(*Continued from preceding page*)

dressed for the races and wasn't used to that sort of thing, or the sun would have noticed the fact. As a mean contrast, I rolled my pants to the knees and next day appeared in white bags without stockings. Now, I'm as brown as an Indian practically all over—I've done nothing but swim and lie on a beach all summer; so my brown shanks made a startling contrast to Betty's lily white ones.

There are a hundred things I should mention, but the space is going, or gone. The immaculate Mr. Chadderton of Stanavo I must mention. He presented me with a fountain pen and pencil on the condition that I should say, "This story was written with a Stanavo fountain pen." It wasn't, so I can't mention Stanavo, although I'd like to for Mike Doolin's sake. Mike and his two pilots did some good formation flying in their Stearmans.

For the love of peace and quiet, don't let some cheese company donate the loud-speaker system next year. Every thirty minutes I was urged to buy cheese, eat cheese, shave with cheese, and oil the typewriter with cheese. If someone must donate the loud-speaker, let the donor be some firm with at least a glimmering of the fitness of things. Too much advertising on a radio program is bad advertising, because the audience invariably turns the dials. We couldn't turn the dials on this cheese purveyor's message—but we could, and did, get so annoyed at him that all of us registered a vow never to eat any of his cheese. Surely someone can be found to sponsor the loud-speaker without having himself mentioned *ad nauseam*. So far as that goes, why can't the race committee hire the thing and not farm out an advertising privilege to anyone?

Cliff Henderson, the old impresario, put on a great show, as always. I don't agree with him in all he does—but I don't forget the financial flops these races were before Cliff was made general manager. He's pulled them out of a hole and made them pay their way handsomely. Perhaps someone else can do the same—I don't know. But Cliff Henderson has proved that he can, and I hope he handles all of them. So long as he can manage shows that go as smoothly as that one went, I'm for him.

Now here's another thing. Remembering the contest committee mess at Cleveland last year, wasn't the way things were handled at Chicago a welcome relief? Then why not hold this race organization together? Have the same men run it next year, and avoid a mess. You take a group of men like Shorty Schroeder, Luke Christopher, Carl Egge, Carl Schory, Ray Collins and Pop Cleveland, to mention only a few of the great corps of starters, judges, timers, etc., and you can't beat them at the work. Then let's try to get them together next year. They can be guaranteed to function, which a new crew cannot be. Keep the whole crowd together, if possible, and have Cliff get his old head ushers and assistants—those who have done it before can make a better job of it again. Let's not start with a new group each year, and have them make all the mistakes of the past, and add on some new errors of their own.

There was the wonderful formation flying of the Army, Marines and Navy—the fanning out in groups of three by the Army being the prettiest maneuver I've ever seen. The initials *A* and *N* formed by the planes a mile high, for Army and Navy—admirable flying. Luke Christopher, a vision of loveliness in blue to match his new Cord car—dear, dear! A treat for the girls. Ray Collins becoming very fat and sort of motherly looking. Roscoe Turner and that big meat-eating chipmunk of his. Down, Gilmore!

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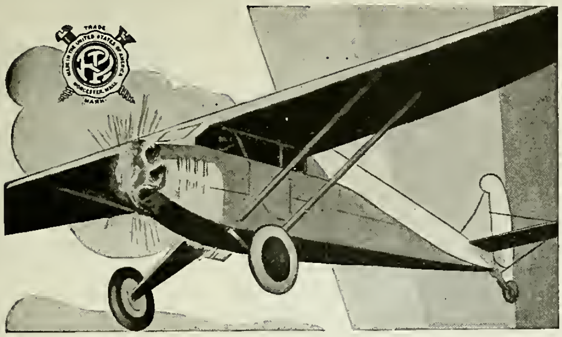

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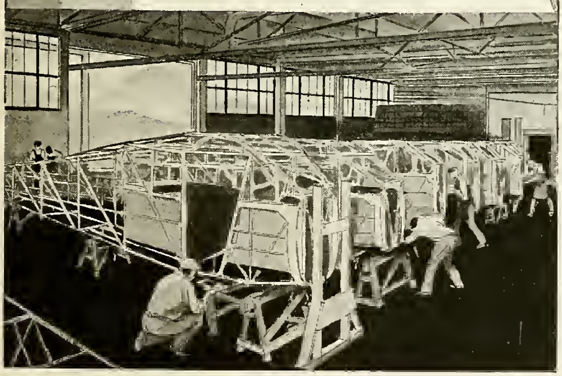

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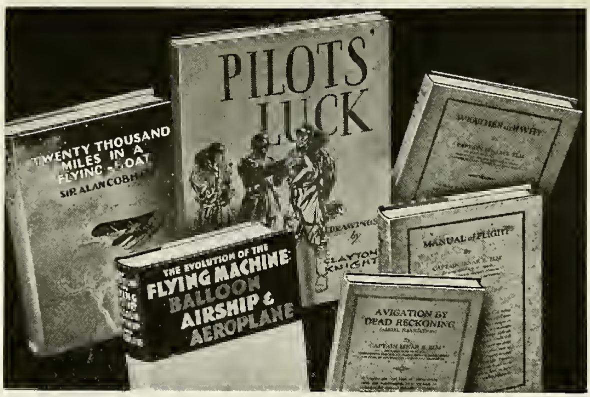

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(*Continued from preceding page*)

The excellent exhibition flying of Freddie Lund, Johnny Livingston, Frank Clark, Doug Davis and others—they should have been mentioned. And Mother Tusch—the sweetest young old lady in aviation.

I almost forgot to mention Casey Jones—he slipped out of races so often that he nearly slipped out of my mind. Casey won a race, but the race committee made out the check, not to Casey, but to the Curtiss Flying Service. This procedure so hurt poor old Casey that he never won another race—once he dropped behind he became discouraged and developed tail-skid trouble, or something, and landed. He was saving his motor, he told me. Well, in these hard times we should all be saving. You know, I was sorry Casey didn't win oftener, for we'd had a lot of trouble grooming him for this race. He was a great old race horse, was Casey. He and Man-O'-War flourished in the same decade—back in 1892, when the Orioles were first hatched. But for the last forty years he's just been put out to grass. The Curtiss-Wright stables pensioned him off and put him in a stall on the thirteenth floor. He used to lie there all day long, munching oats and switching flies off himself.

Well Sir, you know Dick Hoyt and I came to his stall one day, and I said, "Mr. Hoyt, why don't you race old Man-O'-War Jones again? He's kind of spavined and halt and wall-eyed, but there may be a race in him yet." Mr. Hoyt considered the matter. "Well, I dunno," he said, "If we dope him up well and give him a shot of ginger, and maybe new glands, perhaps he can do something." The upshot of it was that we sent him to the vet and had him keel-hauled and rebuilt, with new parts here and there; and hanged if he didn't come romping down the stretch a winner—in one race. But that's all there was in him. His wind had gone back on him.

I could chat to you about those races forever. They're the first I've seen in their entirety. Sure, sober every day. What a shock to the lads! I'm on the wagon indefinitely, what's more. And how temperate every pilot was! Can't quite figure if it was due to an increase of sense or a decrease of dollars. Both, perhaps. Do you know? This business is going dry. Good thing. And henceforth the other boys can have my share. Started life full out for wine, women and song. Never was much of a singer, and now I'm off the wine.

And did the National Air Races promote aviation? Well, we all had a good time. Rusty Bounds and I were chatting and looking at the stands filled with 75,000 people, all of them watching some stunt flying. "I wonder if all this stuff is making them air-minded?" I asked. "Or is it scaring them away from airplanes? What do you think?"

Rusty grinned. "If you and I were at the zoo standing before the monkey cage," he said, "we probably wouldn't be monkey-minded. Yet somebody would say, 'There's Cy Caldwell and Rusty Bounds thinking of buying themselves a couple of monkeys.' I think all those people are just watching us do our monkey tricks, that's all."

Anyhow, the races told me that the system of horse-race starts that I designed and first described in AERO DIGEST in 1926, at last has been tried and found to be successful. For the first time in the history of the National Air Races the spectators could tell each lap who was winning. It changed races against time into races against other airplanes. I thank Cliff Henderson and the members of the Contest Committee for having the courage to discard antiquated methods in favor of new, if at first glance somewhat radical ones.

(*Continued on following page*)

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The world's oldest and greatest flying organization and the world's best planes and plant are behind you when you enroll at a Curtiss-Wright Flying School. Here master pilots train you. Here you learn about planes from the world's biggest builders who've spent 20 years training over 4,000 students! That's the record of Curtiss-Wright! Write your name and address on this page and we will give you complete details and a letter to the manager of the Curtiss-Wright Flying School in your locality.

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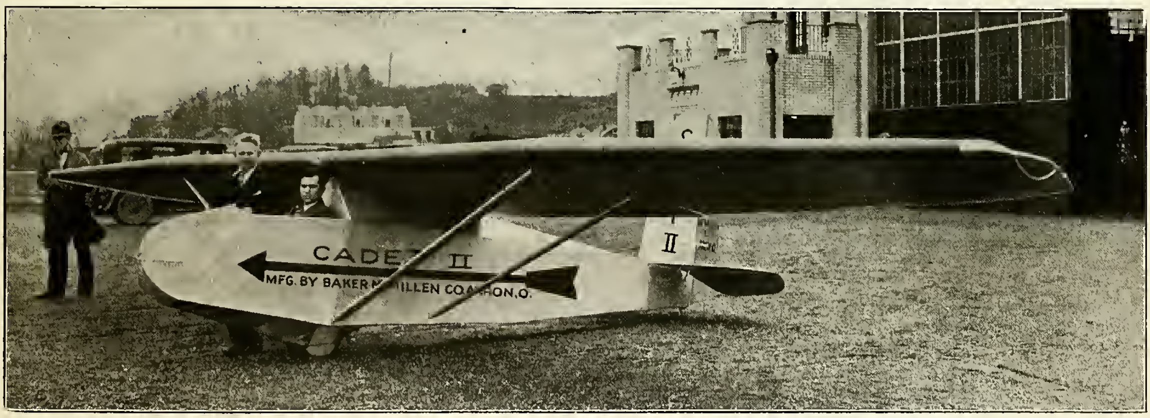

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(*Continued from preceding page*)

Also the races, and Dick Blythe, told me what I am. I am, it appears, *a paid watcher*—one of that select coterie paid by some firm or individual to go to the races, watch everything, and do nothing. Public relations counsel, vice presidents generally, directors of companies, and others who act as the gold lace on the aeronautical garment, are sent to the races as paid watchers. We perform no labor whatever, yet someone pays us for it! It's remarkable! You've seen us around, of course? We always have press badges, and passes; we see all, know all, meet all—and toil not.

We attend all the banquets, on free tickets or expense accounts, and grouse about the food; we have the best seats in the stands, and complain because there are no cushions. And, privately, we marvel that we are there. Well, I've discovered why we are sent. Good hearted companies ship us along merely to swell the crowds. Have you ever noticed that the reports say, "A crowd of 70,000 attended?" or "The crowd numbered 55,000?" Never does it say, "There were 69,876, or 54,987 in the stands." Always it is an even number. And we—the paid watchers—are the fellows who are sent there to make the numbers even. In a crowd of 55,000 we are the three zeros. In a crowd of 70,000 we are the four zeros. Without us, the count would be confusing and hard to remember.

AIR MEETS OF THE FUTURE

(*Continued from page 46*)

The Thompson Trophy high speed event should certainly be run over a much longer course. The shape of the course should receive a greater amount of attention and should be in conformance with the best thought for the operation of high speed aircraft.

In regard to accidents, statistics show that hundreds of people are killed each year in motor boat competitions and automobile events, yet the fact seems to arouse very little comment. Three contestants and one spectator were killed at the Chicago races this year. The spectators at Chicago, however, were not unfavorably impressed with the danger of flying because of these casualties, for the statistics of the races show us that 10,000 people were willing to embark as passengers for sightseeing flights during the ten days of the contest. There were approximately 8,000 landings and take-offs during the races and on only one occasion did a casualty result from the normal operation of aircraft, and in that instance the airplane was of highly experimental design.

A yearly national demonstration of sufficient size and importance is apparently in the picture to stay, and is undoubtedly destined to influence and shape American aeronautical development.

A TALE OF TWO CITIES

(*Continued from page 48*)

ganized and conveniently scheduled, and the rate is low——possibly too low, but that's none of my business. It has started off well, with 1,557 paid passengers in the first ten days of operation and a record of ninety-five per cent scheduled operation. It will be well for the brethren to watch closely the progress of the Ludington line, as its hourly service swings back and forth between New York and the nation's capital. It represents not only one of the soundest ventures to date in passenger service, but is a laboratory test of air transport under the best available conditions.

(*Continued on following page*)

The Floyd Smith Safety Chute released and partly opened. The Pack Cover, at the right, springs off as a perfect Pilot Chute. The canvas strip, rising vertically in the center, acts positively as an Ejector—not essential, but an added assurance to instant action.

Note the makings of

Parachute Safety

FIRST—the Cover (protecting the Chute, when not in use, from wear, damage, weather) must be completely removable INSTANTLY.

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W. C. Rickels says, "After I completed your ground course, which prepared me in the principles of flight, I was able to solo in 7 hours." Floyd Prothero says, "Your method of instruction not only gave me a thorough knowledge of Aviation, but you also showed me how to capitalize on what I learned.

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It is not necessary for you to give up your present job. You go right ahead working and earning money the same as you are doing now. Right in your own home, in your spare time, you do your lesson assignments and perform experiments, and in a few short months you will have a knowledge of Aviation that will qualify you to quickly work to the top in this fascinating big pay field.

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After you graduate I assist you in getting a job without any cost to you. I am so sure that you can learn Aviation with my help and step into a big Aviation job that if you are not satisfied when you have finished my course, I agree to return every penny of your tuition.

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You don't need a College education to master my course. It is so thorough and complete and everything is so clearly explained in text, diagrams and pictures that in a few months you will be able to grasp the principles of Aviation ground work, and be well on the road to qualify for an important Aviation job. My Home Study Course will give you all the knowledge necessary to pass the government's written examination for mechanics' or pilots' licenses.

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Major R. L. ROCKWELL

The Dayton School of Aviation, Desk Y-43, Dayton, Ohio

(*Continued from preceding page*)

The weak link in the line is at the New York end, where the planes come down to roost at a bus terminal which is still forty-five minutes from Broadway. Nobody seems to know what to do about it, unless New York can be started all over again or moved over to Newark, but my partisan pride for Philadelphia compels me to say that we do things differently down our way. Central Airport is no more than twenty minutes from the center of Philadelphia, the terminals of three railroads and the trunk line of the Eastern highways. The mail trucks can go from Central to the Philadelphia postoffice in twelve minutes flat. And a curious circumstance about this nearness to the center of things is that Central Airport is neither in Philadelphia nor in Camden, but beyond them both in Pensauken Township, New Jersey. It was an inspired anticipation of the trend of traffic that put Central Airport exactly where it should be to serve the best interests of two great cities. It lies directly in line with the Delaware Bridge, with the world's finest network of concrete highways running all around it. It is nearer in miles and minutes to Philadelphia's crossroads than any of Philadelphia's own airports—nearer than even Hog Island will be when it is built and made approachable by rapid transit.

This is one reason why business at Central begins to look impressive. More than sixty scheduled planes go in and out every day, and there will soon be more. The place is already too busy for small-time air meets, and can even afford to consider hop-traffic as something of a nuisance. And yet, although this is a lot of planes per day and a mark for young airports to shoot at, it is a pathetic few in proportion to the proper ambitions of the air age. Consider its comparison to the totals of surface traffic. A normal average of 1,164 passenger trains move in and out of Philadelphia every day. As many as 60,000 automobiles have crossed the Delaware Bridge in a day; a daily average of about forty deep-sea going ships is reported in the harbor. That is the scale of modern metropolitan traffic, and aviation has a long way to go to compete with it.

But it is something to know that so many people are moving around, and that so many of them are next-door neighbors to Central Airport and the airlines that lead out of it. I was led to think so when Sanger Green, pilot extraordinary, manager plenipotentiary and master of ceremonies in general at Central, invited me to look over Philadelphia and Camden from an airplane flying high on a summer night. We shoved off in the level rays of the landing lights, headed for the harvest moon and climbed high for safety to the altitudes where one landing field is nearly as good as another to a tired airplane; high enough so that a city of 2,000,000 people became a patchwork of light, an intricate pattern embroidered in golden thread, a pool of brilliance set in the velvet black of night. Over on the Jersey side could be seen how the highways from the sea point to the big bridge; dark down below was the winding Delaware, spanned by linked lights like a necklace on a queen among rivers, spotted here and there with slow moving water traffic. On the dark horizon flashed the lighthouse beacons to guide the night riders of the sky; patches of pale light showed where the street-corner cowboys puttered and putted around the miniature golf curses. High above watched the quiet moon, its cold radiance lost in the glow of the great city.

What fools we mortals be! So many of us—not you nor I, but a couple of other fellows—will spend a week's wages on some dizzy dame to show her a new night club full of suckers and headaches, and will pass up the privi-

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lege of sailing the night skies, an experience unparalleled and which only a few have tried, even in this adventurous generation. And those who work all day in a dusty, drab and crowded city, doing their best to think well of it and trying sometimes to comprehend its true scale and dignity, should see it at least once from the air and preferably when the lamps of evening are lighted with magic fire. I have known Philadelphia for twenty years and more, scorned it in spots and liked it right well in others, but now that I have seen it all at once in its night glory I can say with Saint Paul, "I am a citizen of no mean city."

Coming out of sky to earth again, we spent the shank of the evening suitably and pleasantly, and in addition surveyed the manifold attractions and excitements of Central Airport. These should be carefully considered by those who think that an airport is nothing much but real estate gone wrong or a merry-go-round for flying students and three-dollar cash customers. Central is primarily an airport, of course, but it is also rapidly becoming a community center for outdoor diversions, where the public goes, not only to fly, but to spend time and money as innocently as possible in this wicked world. It owns a pretentious swimming pool, a sheet of sparkling water studded with bathing beauties of all sorts, shapes and sizes, where attendance on hot summer days mounts above the thousand mark. There are a couple of restaurants, and at least two peewee golf lay-outs, with gasoline stations to match the traffic. There are prospects of professional football and baseball, and possibly there will someday be a country club at popular prices, with all the amusements which make country clubs the natural refuge of the tired business man.

There's a sound idea behind this apparent digression from the serious business of aviation. Everybody knows —or should know—that a metropolitan airport cannot pay its way by lifting timid tourists off the earth and back again at three dollars a lift. Schools have their limitations and selling storage space to airplanes is not the most dignified business of an airport. The overhead of the wide open spaces needed to care for airline traffic must be borne somehow, and it's at least a promising idea that it should be carried by the concentration around a suitable flying field of all sorts of entertainment enterprises. I have heard that some European airports maintain themselves largely by providing commodious and comfortable beer gardens on the sidelines, where those who won't fly may pay painlessly for the privilege of watching those who do. Just at present the beer isn't available for the liquidation of airport overhead in America, but the varied interests of a pleasure-seeking crowd can be cultivated and catered to under fa-

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vorable conditions, and keep people coming and contented while the proper business of an air terminal grows up to its proper proportions. Something of the sort is under way at Central, where there are perhaps five million possible customers within a range of ten miles or so. And in the meantime, none of these sidelines interfere at all with air traffic or detract from the perfection of appointments with which the field is equipped.

So much for Central Airport, a credit to its management and to the cities which it serves. Its history and prospects invite a comparison with the great project which is more or less under way down south in Philadelphia, the "three-way" terminal at Hog Island. Some of the brethren are disposed to recall the story of the two oysters in a stew, who wondered what needs there was for both of them, as they contemplate the prospect of two major airports within shouting distance across the Delaware. But Hog Island is destined for a different sort of development, if ever somebody can find a spade and start work on it. It is a natural industrial site, served already by rail, road and river and surrounded by great open spaces where factories might smoke their heads off without disturbing the neighbors. Already it is reported that three major aeronautical manufacturing plants are looking for leases on or near the tract. There will be others, whenever Hog Island recovers from its reputation as a government discard and is made habitable. That is Philadelphia's biggest job for aviation at the moment, and success won't hurt the neighbor airport across the river, which will always be nearer to the traveling public than Hog Island. Perhaps the Philadelphia venture will someday be the terminal of air freight or its suitable equivalent, as well as the center of a great aeronautical industry. Meanwhile Central is likely to be the passenger terminal for a long time to come, until there is so much traffic upstairs that two big airports won't be nearly enough for several million people.

This is a tale of two cities and their problems of adjustment to the new era of air transport. Every city has one like it and every one is interesting. Some turn out well and some go sour, but they are all a part of our national experience by which the future will learn wisdom. Someday, no doubt, these little airports with their tiny flocks of planes coming and going on ninety per cent schedules will seem silly and amateur to the people of a winged world. But when that time comes, the future should allow fair credit to those of today who tackle the airport problem with so much energy and enterprise. They also are among the pioneers.

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GLIDER FLYING AT CAPE COD

(*Continued from page* 61)

art of motorless flight, which takes us right up to our present generation.

The 1930 opening of the school was delayed until about the first of August and then under the auspices of the Cape Cod Glider School, lessee of the property owned by the American Motorless Aviation Corporation. The new corporation is being operated by a picked personnel of long experience in the aircraft field. Among these are Capt. Sumner Sewall, Capt. Sherborne Eaton and Major Biddlecomb, all of whom have outstanding records in the air service.

Students are enrolled for periods of time ranging from a few days to several weeks. Pilots are taken care of by special short courses. Action is the keynote of the school, and it is more than likely that a new student will make his first hops in a primary glider on the very day of his arrival.

The equipment used is of German manufacture, and skilled artisans are employed to keep it in perfect condition. The gliders are of the famous Rhön Rositten Gesellschaft design and comprise primary, secondary and soaring types. Special light gliders and two-seater machines are also used.

The methods of instruction are carefully planned after the approved practice instituted by the German instructors, employed during 1928 and 1929. All launchings are made with shock absorber cord. Every possible precaution is taken to insure safety in training. Horses are employed to do the laborious task of hauling the gliders up the grades and also, when feasible, to assist in the launching of the machines.

This is the picture of activities at the Cape Cod Glider School. Progress has been substantial, and attendance has been good considering the newness of the project. In 1929 it is reported some ninety students took instruction for various periods of time. Among them was Lieut. Ralph Barnaby of the United States Navy, who later descended from the dirigible *Los Angeles* in a secondary glider purchased from the school. No serious accidents have occurred, though thousands of flights have been made.

Perhaps this represents the ultimate scope of such a project, or perhaps it is just a beginning soon to be overshadowed by far greater achievements. During my last visit as I sat on the great sand ridge and gazed out over the blue Atlantic, listening to the thundering surf down on the beach below, a picture of a far bigger enterprise molded itself into form. Here was an ideal location; here were hangars and buildings, representing a vast outlay of capital; here were machines, workshops, meteorological instruments and equipment. Could it be possible that the operation of a commercial project, such as the school, is the utmost to be realized from such a venture?

My thoughts ran over the progress of motorless flight in Germany for the past ten years. From a crude start, under the restrictions imposed by the Treaty of Versailles, it has developed into a precise art, an absorbing research, and a nation-wide sporting, competitive event, involving the leading technical universities of the country.

There is a tendency among Americans to glorify that which is done abroad in order to justify criticism of a particular home project. However, mention is made here of foreign achievement only to remove any doubt of the feasibility of such an enterprise. As a matter of fact, we quite probably have a greater number of gliders in the United States today than are to be found in Germany. It would not be surprising if the total number of pilots, embryo or otherwise, to be found at home, eclipsed those abroad. We hear much about the German annual Rhön contests. We picture, possibly, hundreds of competing gliders, but the 1929 contest, for example, recorded only thirty-six entries and only twenty-six actually competed.

The point is that our glider movement under the commendable leadership of the National Glider Association has grown with startling rapidity. Many aircraft manufacturers rushed into production of gliders without giving the matter much study. Gliders began to appear on the airports. Towing by car with rope or cable became quite common. Stunts were applauded. Curious crowds encouraged the spectacular. Fragile, poorly designed gliders hurtled through the air, towed behind high-powered planes. As a result lives have been lost and public opinion has been influenced unfavorably. In the face of this we surely can look abroad for guidance in an effort to get our bearings after this inauspicious start.

In Germany the technical schools form the nucleus around which the whole movement revolves. These schools use the Wasserkuppe in the Rhön mountains for their flight university. The schools, through their professors, design and in many cases also build their machines for the annual competitions. Here is a combination of technical research, engineering, competition and sport. Each year records are broken, machines become more refined, and pilots more skillful.

In a country as great as ours it might be advisable to concentrate the efforts of experimenters in several localities. Already we have Cape Cod in the East and Point Loma, San Diego, California, in the West. The addition of a somewhat central point would seem necessary to avoid excessive traveling.

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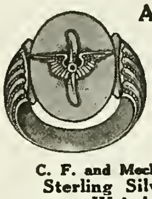

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AERO DIGEST

THE EMPIRE IN THE AIR

B. O. Howard ■ David Lawrence ■ Dr. Max Munk

NATIONAL SOARING COMPETITION

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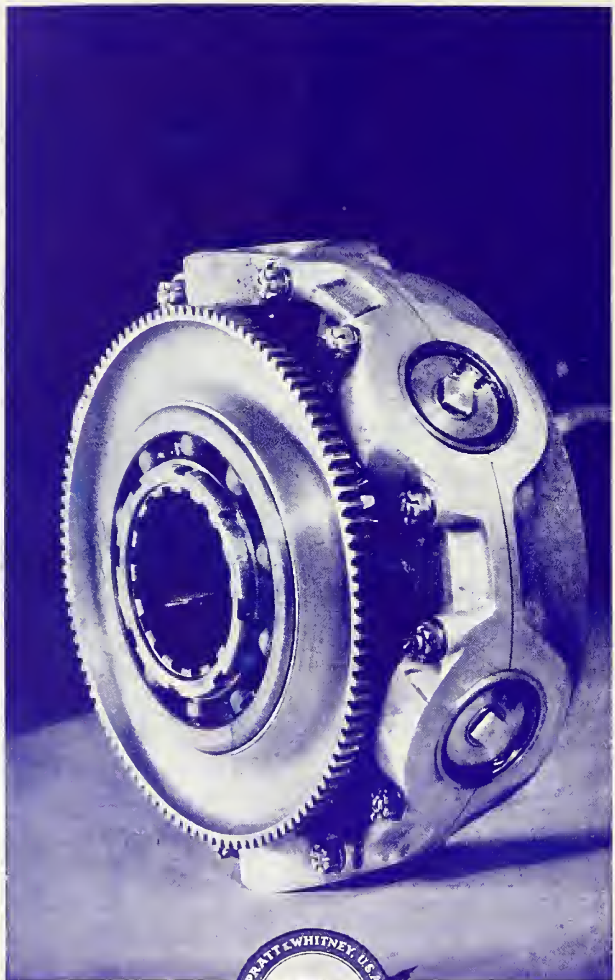
REDUCTION GEAR DRIVE

FOR SLOWER PROPELLER SPEEDS



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An Autogiro at the National Air Races, Chicago, August, 1930

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a statement to the aircraft industry

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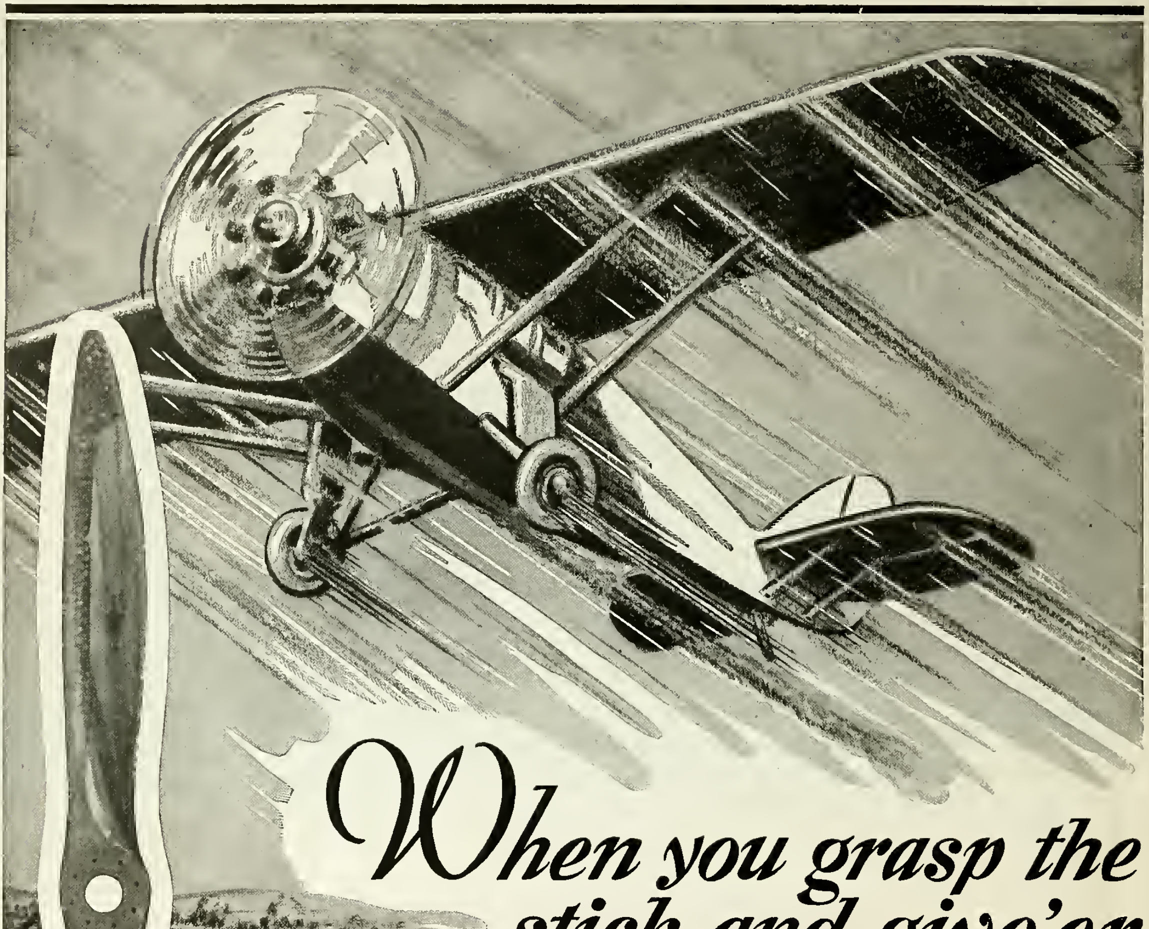
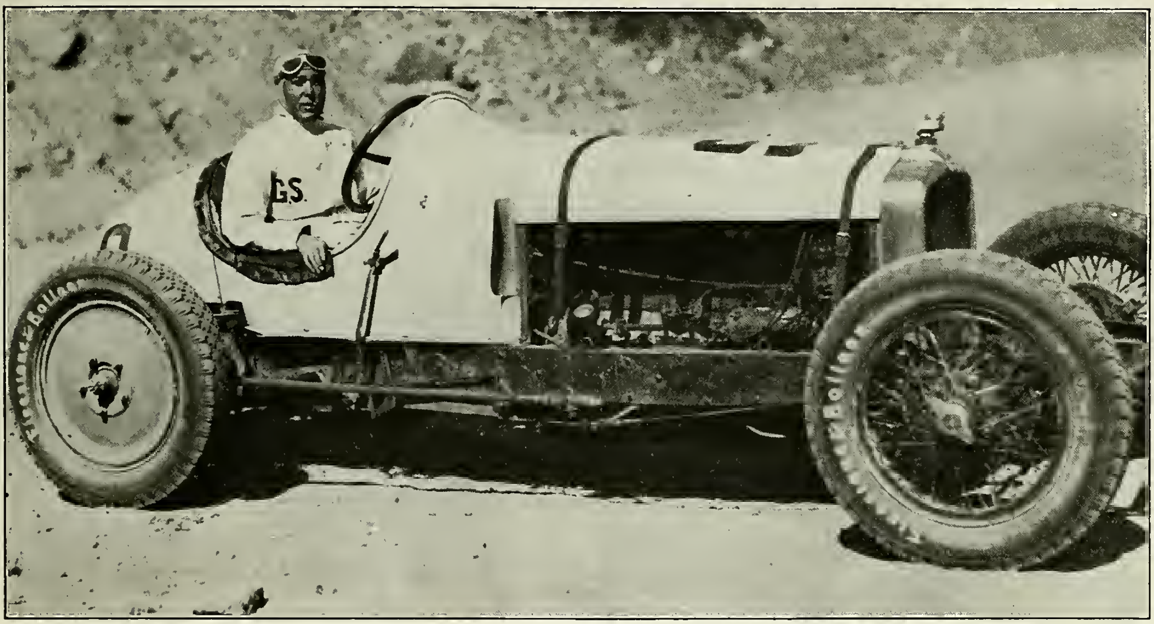
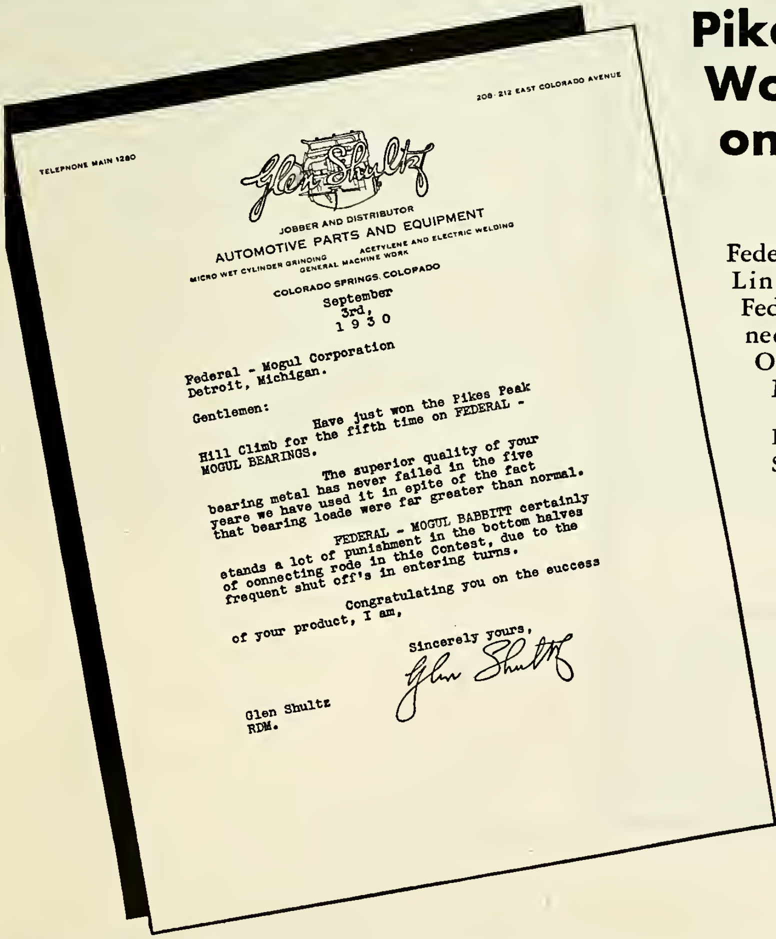




Pike's Peak Climb Won for 5th Time on Federal-Mogul Bearings!



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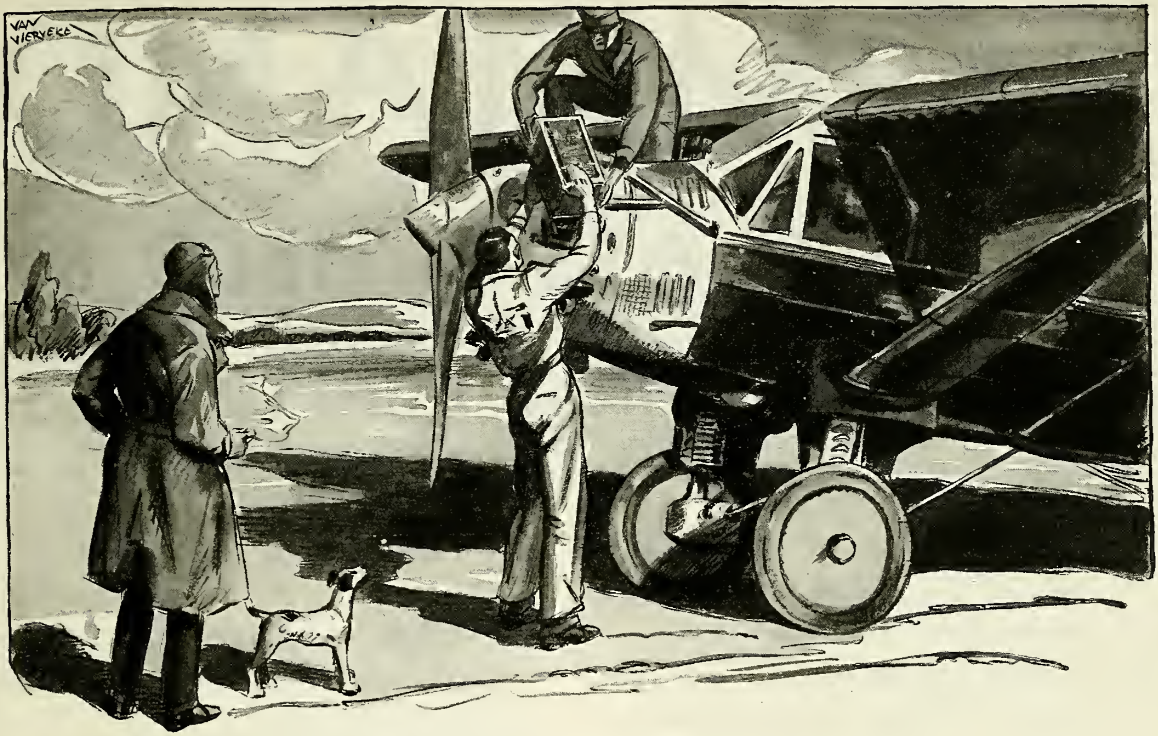

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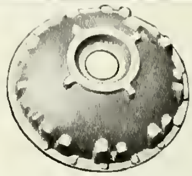
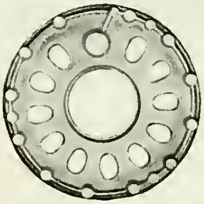
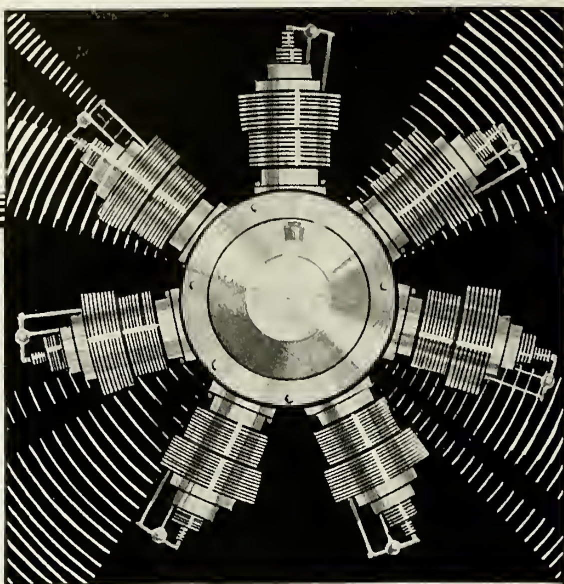


Nose piece for radial engine, forged of Alcoa Aluminum.



Front bearing plate for airplane engine, forged of Alcoa Aluminum.



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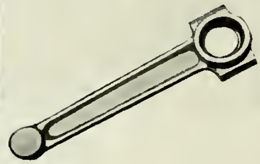

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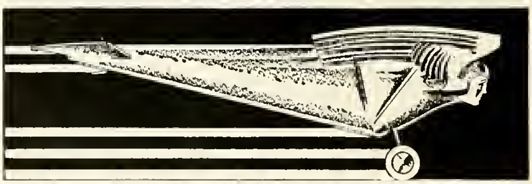

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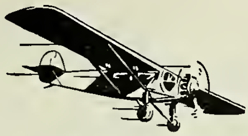

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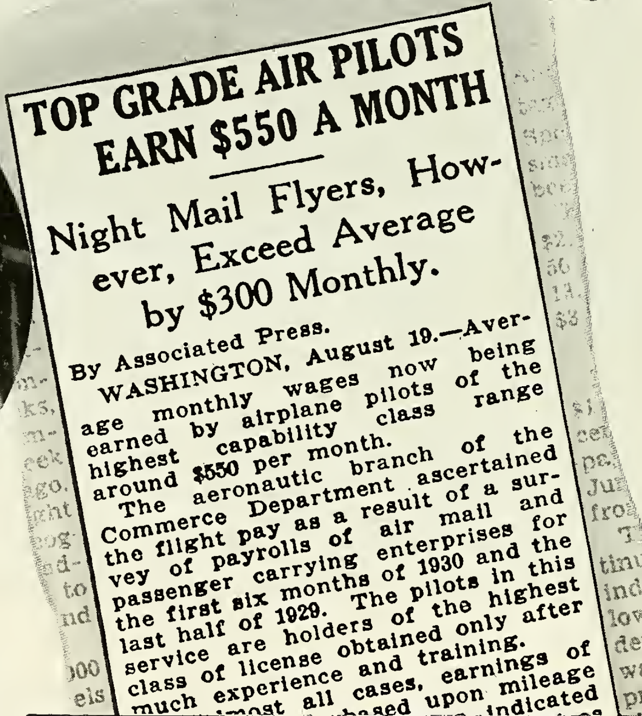

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By Associated Press.

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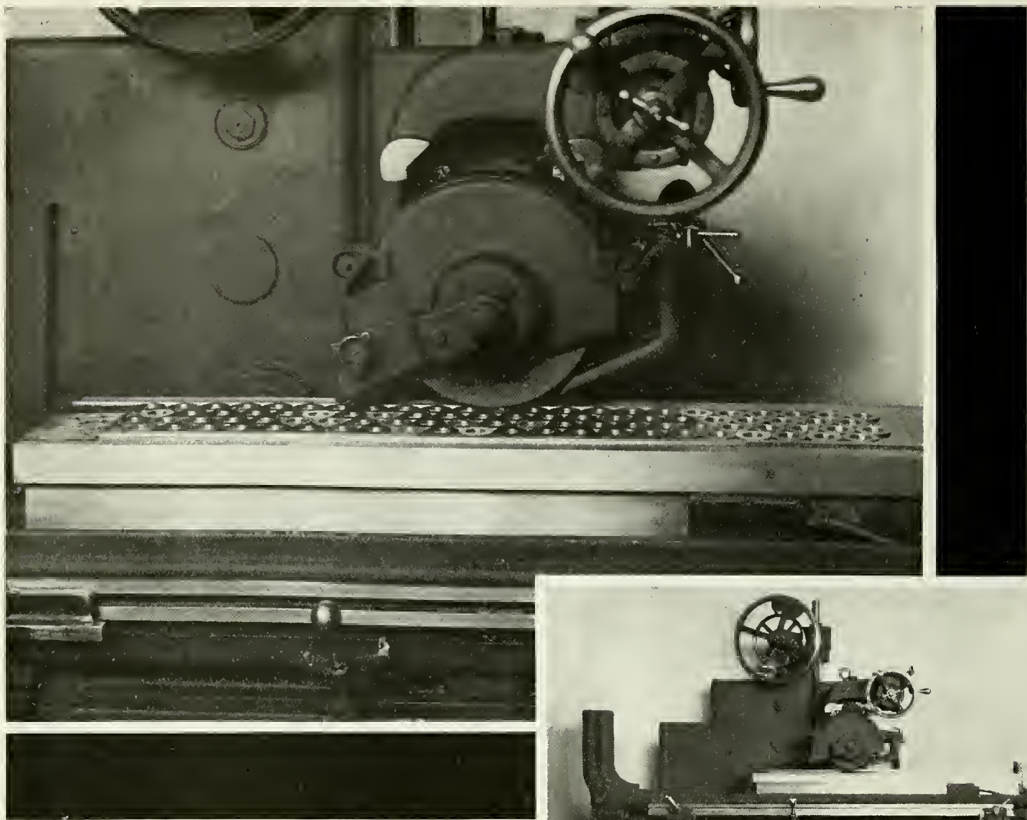

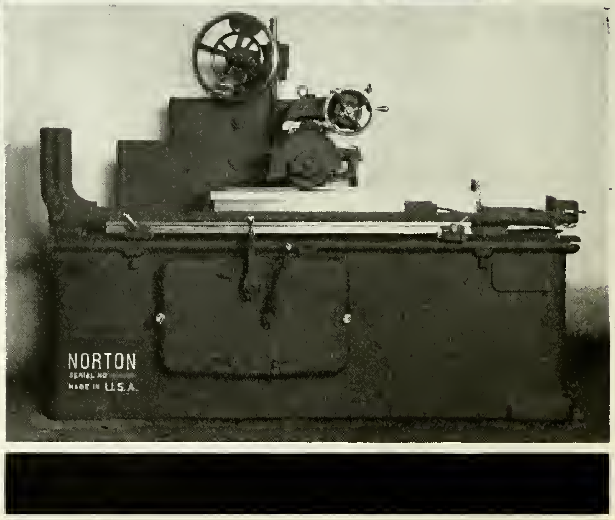

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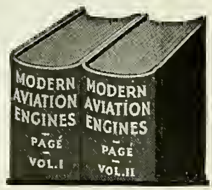

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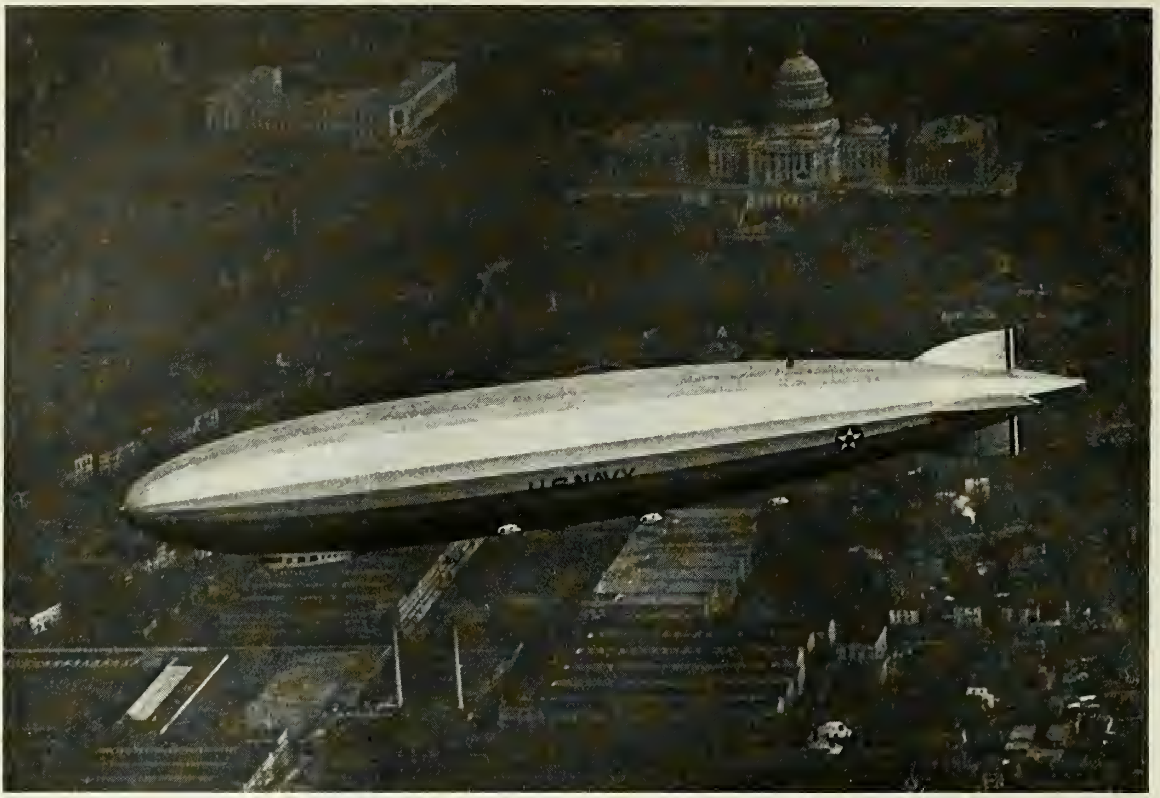
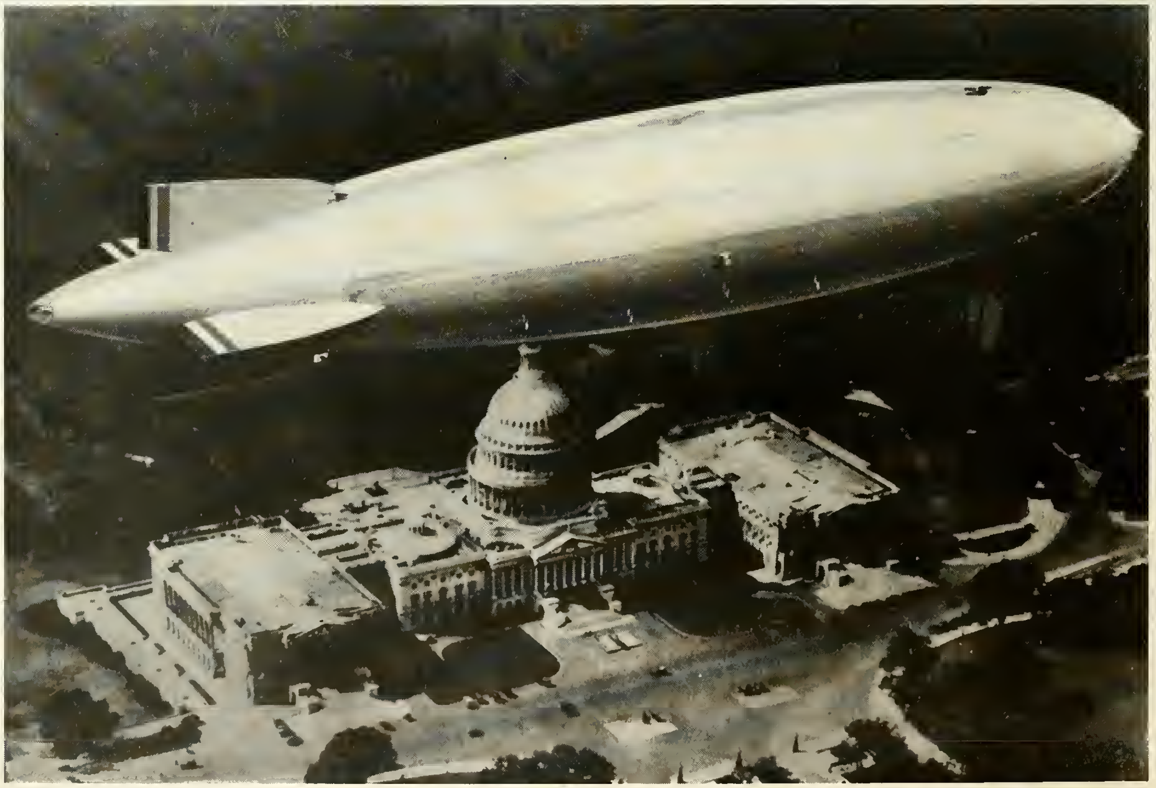
CONTENTS

Vol. 17　NOVEMBER　No. 5

Cover design: Ford Airport, showing new trimotors and other planes which competed in the Reliability Tour



Present and Future Rigid Airships of the United States Navy Over Washington. (Above) the "Los Angeles" and (below) the ZRS-4, now under construction



THE EMPIRE IN THE AIR

By Francis D. Walton

A DISTINCT world shock was sustained by the structure supporting the development of lighter-than-air craft when the British Air Ministry dirigible R.101 crashed on a hillside near Beauvais, France, on October 5, carrying to their death forty-eight persons, among them the leaders in the development of the air policy of Great Britain.

Such disasters as these cannot be dismissed as national losses alone. The blow to public confidence in air transport is too great, and that confidence too valuable a commodity. The failure and the blame, wherever it may be fixed, will not attach discredit to one country alone, but indirectly to the air effort being made by all countries which are seeking to establish man's claimed right to a place in the skies. Such setbacks cannot help but be felt universally, and particularly wherever labor and money is being expended to develop dirigibles and dirigible transport. At the present hour the United States stands in the fore-rank of nations making such an effort.

There is a great need—and it was not ignored this time—to muster whatever arguments can be summoned to uphold the cause of airships, for such times as these are the critics' hour. And the critics are never missing, never seem to be asleep. The destruction of the R.101 might in a sense, while one is speaking of critics, be called a "direct hit" for E. F. Spanner, British writer, member of the Royal Corps of Naval Constructors, (retired) member of the Institute of Marine Engineers, author of "The Broken Trident" and "Gentlemen Prefer Aeroplanes," and consistent disbeliever that the sons of John Bull have any business in the skies in airships. In a another work, and a large one, "This Airship Business," Mr. Spanner practically explained why the R.101 could never get to India. For a critic of such parts the tragedy on the French sea-coast hills can hardly be unmixed with some small personal satisfaction.

But even so severe a detractor of England's aspirations in lighter-than-air as Mr. Spanner is, nevertheless concedes that if there is anything at all "in this airship business" the direct and nationalistic disciples of Count Zeppelin should have it.

So the destruction of the R.101 once again turns the spotlight on the interesting alliance which has developed in the apparently natural course of events in the promotion of American airship projects. It was the second revelation of its kind this year, the second within a space of four months, of the source from which flows the strength of our own airship undertaking, and the unique nationalistic detours it makes in getting to us.

When the wind of the St. Lawrence Valley ripped the fabric from the stabilizer fins, port and starboard, of the R.100, sister ship in commerce of the military R.101, as the former ship was nearing the end of her maiden trans-Atlantic voyage last August, they did a little more than merely reveal the secret of the new girder construction of the R.100. They uncovered more than metal stuff.

P. & A. Photo

The ill-fated British R. 101

His Majesty's airship R.100, multi-engined dirigible of 5,000,000 cubic feet flotation gas capacity, arrived at St. Hubert's Airport near Montreal, early on the morning of August 1 from Cardington, England, and by geographic and political circumstances was officially welcomed from over the seas by a Frenchman. We cite these ironic and apparently irrelevant facts with a specific purpose in mind. The first trans-Atlantic flight of the R.100 marked the second time that a British-made dirigible had crossed the Atlantic Ocean. The flight, so the British Air Ministry tells us through its effective and far-reaching system of propaganda, was for the purpose of demonstrating inter-colonial airship communication between the home country of the English and its dominions. The ill-fated flight of the R.101 from England to India was to have been such another demonstration. So much for the facts which are provided in the statements of the British Air Ministry.

At Montreal the R.100, her officers and her crew were accorded one of the most apathetic receptions which has ever marked a signal air achievement. The R.100 did not come to the United States where, I am sure, a more enthusiastic official and unofficial welcome awaited her. It was not so planned that she should. Two accidents which befell the airship over the St. Lawrence Valley created a necessity for repairs which I believe all airship engineers are agreed could have been more effectively made in the United States than at the million-dollar outdoor tower of St. Hubert.

But still the R.100 did not come to the United States. If she had, however, she would have been welcomed into our air harbor not by a Frenchman, but by what our British cousins frankly believe and vie was Germany's great airship ally.

We may accept for the moment the statements of the British Air Ministry that the sole purpose of the tran-Atlantic flight of the R.100 was for the purpose of demonstrating inter-dominion airship communication, although I was personally warned in Montreal by no less a person than the builder and designer of the R.100 that there had been too much and too easy an acceptance of this propaganda by myself and my colleagues of the American press! But consider this statement of purpose accepted for the moment. Nevertheless, with the arrival of the R.100 on this side of the Atlantic another fact became true. Great Britain had at last evened a score with Germany in the matter of airship performance. Remembering the delivery flights of the *Los Angeles*, the R.34 and the pioneering flights of the *Graf Zeppelin*, the arrival of the R.100 made the score two for Germany and two for Great Britain.

This fact may, or may not, be

significant in the larger program of Great Britain's Air Ministry. That program has one essential objective: the establishment of the empire in the air, as it was long ago established on the high seas.

We are to view this flight, then, as an empire project. It was pure irony that the only available haven in the Dominion for His Majesty's airship was on the edge of the predominatingly French city of Montreal. On the day and the night of the scheduled arrival of the R.100 there was a mere handful of people on St. Hubert Airport. In size and apathy it resembled a "fair-to-middling" Sunday afternoon throng at an American flying field. This condition fitted in excellently with the purposes behind the Air Ministry's plans.

The attitude which British airship interests hoped that the Canadian public would take regarding the visit of the airliner was reflected in an official statement on the purpose of the flight released to the press the day before the R.100 arrived at St. Hubert Airport. This statement said:

"The flight of the Air Ministry airship R.100 to Canada is being undertaken as part of the Ministry's development policy for airships with the object of testing out the reliability and behavior of the airship on a long-distance flight. Data also will be acquired which will be of value in deciding upon future policy with regard to the development of airships for commercial purposes, with particular reference to speeding up communications among the British commonwealth of nations."

There was certainly nothing here to justify the Montreal public in going wild with frenzy over the visit of the overseas airship, to view the occasion as the triumph of man over the elements. And Montreal, being predominantly French, didn't do this. It was content for its first official reception with a small meeting in one corner of a hangar on the airport at which Mayor Houde of Montreal extended the official welcome.

The day before this far from inspiring show, I called upon Sir C. Denistoun Burney, designer of the R.100, in his suite at the Mount Royal Hotel. When I came he had just finished reading a batch of New York newspapers, and almost his first remark as he rose to greet me was, "Well, I see your papers in the States, too, have been falling for all of this British air propaganda."

Word had just been given out that the R.100 would not go to the Lakehurst Naval Air Station, and I asked him about this. He told me the report was correct, that under no circumstances would the airship be sent to the United States. The orders from the British Air Ministry were emphatic on that point. The chronology of these events is not easy to establish, but as I have every reason to believe them, before there was even any press discussion and certainly long before an official invitation to go to Lakehurst had arrived, the home office in England sent emphatic word that the R.100 was to be repaired at the mast at St. Hubert. Any idea of taking it to Lakehurst was discouraged at the outset, although no invitation to do so had yet been received. Secretary Adams, however, later made the invitation official and this merely stressed the determination of the British air interests to carry out their job without our assistance.

It is reasonable to understand the nationalistic pride behind the desire to keep the affair an entirely self-dependent inter-dominion undertaking. But there was another factor concerned when such repairs as could be made at St. Hubert were admittedly only emergency repairs upon which the safety of human life had to depend in the immediate future flights. This certainly would seem to justify giving over of the small matter of nationalistic pride. Anyone who witnessed the efficient manner in which the Navy men slapped the *Graf Zeppelin* down on the floor of the hangar at Lakehurst as if she were a toy balloon to make the necessary repairs to her stabilizer fin, must view with skepticism the British do-or-die spirit with which the Canadians were called upon by an imperialistic home office to do a similar job to the R.100 as she swung a victim of every breeze at the tall St. Hubert mast. Did the R.100 come to the shelter of an indoor repair at Lakehurst? No. Officers of the British airship admitted that they would not be able to do "a very pretty repair job" at the Canadian airport. Did this alter the plans and orders from England? No. Certainly then there must have been more here than a simple desire to carry through single-handed on a job which the American Navy offered to help out with.

I give you, as a possible answer and as Exhibit A, the International Zeppelin Transport Corporation, a Delaware corporation, formed and organized to study, promote and develop the plans of Dr. Hugo Eckener and the Zeppelin Luftschiffbau of Germany for a trans-Atlantic dirigible service. Financially interested in this organization are such groups as the National City Bank of New York, the Aluminum Company of America, the Goodyear-Zeppelin Company and United Aircraft and (*Continued on page* 162)

Courtesy of Airmap Corporation of America

The German-built dirigible "Graf Zeppelin" cruising majestically over New York City

THE TREND OF THE TIMES

By David Lawrence

NEARLY a year has passed since the stock market crash. What have business men learned in the interim? First, that the disturbance was no superficial squall, but a fundamental readjustment of currents and tides; second, that the way back to equilibrium lies in the restoration, if not the reorganization, of basic things like the agricultural and automotive industries.

DAVID LAWRENCE, authority on national affairs, Washington correspondent, and editor of the *United States Daily*, was born in Philadelphia in 1888. Beginning newspaper work while still in high school, Mr. Lawrence has had one of the most distinguished careers in American journalism, having been correspondent for the Associated Press while a student at Princeton; member of the Washington staff of the Associated Press; for two years its White House correspondent; chief of its international affairs department as covered from Washington; Washington correspondent of the New York *Evening Post* from 1915 to 1919; founder (1919) of the Consolidated Press; and founder (1926) of the *United States Daily*.

Mr. Lawrence's remarkable accuracy, his penetration and his unceasing study of the background of events have earned him a position of authority. His fairness and his non-partisan viewpoint have caused him to be continually called upon for his views on important subjects in current history.

Assuming that every business depression has its psychological factors which retard a return to normal, there are two things which stand out as having slowed down the wheels of progress. One is the diminished purchasing power of the masses, due to unemployment on the part of millions of our citizens; and, second, the failure of production and consumption to maintain a balanced relationship to each other.

Business men everywhere recognize now that efficiency never was more compelling and that the difference between essential and non-essential services in America is becoming more and more pronounced every day. To put it another way, the costs of doing business, the costs of production, the costs of selling, the costs of planning and the costs of distribution and, lastly, the costs of management, as a whole, now are undergoing minute scrutiny.

One of the biggest items in the cost of doing business in America today has been the cost of money. Credit operations are not only the cornerstone of expansion, but the very backbone of every-day transactions. Installment buying has proved economically sound throughout the present depression. The big financial turnover of our large corporations has been made possible by popular ownership of securities. Progressive capital operations are feasible when the Federal Reserve System keeps currency flexible and money at work, thus permitting America to finance itself at the lowest rates of interest in generations.

Readjustment takes time. Early in 1930 bankers did not buy bonds because they still had their eyes on the call money market or because they felt the bond market would drop again and leave them with losses on their investments. Now, toward the end of 1930, bankers wish they had bought bonds earlier in the year so as to have maintained a better average throughout the year for their idle funds. With the return of the bond market, money is put in circulation once more, not only in the companies that need extra capital for efficient operation, but with those which desire to refinance old loans at lower rates of interest—again cutting down the cost of money.

Next comes the cost of selling. Wasteful methods are not discerned in times of prosperity. In an era of economy, selling becomes efficient. The motor industry, for example, has waited for the prospect to come to the show window—the work of the individual salesman has never been extensively developed. And, yet, what product selling at a unit of more than fifty dollars depends upon the prospect to come to the store? Ways, for instance, of finding out the mechanical inadequacy of old cars and other scientific methods of getting a line on the replacement market suggest the selling job that the motor industry has to do.

And so it is with agriculture. We are going through a process of reorganization to determine a method of orderly marketing. We may not like what the Farm Board is doing, but out of its experiments will come a plan to put agriculture on a better basis. The solution is not just around the corner—it takes time. When consumption and production have been balanced with respect to agriculture, the raw products and by-products that are bought in the agricultural states will move more evenly to that market. There is no practical formula for regaining prosperity except by restoring the health of all the big units in American life, which, summed up, constitute its composite purchasing power.

Government can do many things to assist in the process of recuperation, but it cannot prescribe the primary remedy. That comes from within—from reorganization and readjustment. The Government is aiding in many ways. It is trying to put money to work through the Federal Reserve System. It is encouraging the distribution of capital to enable the farmer to finance himself over bad years. It is not going to increase taxation. The corporation tax in effect at present will not be raised. The Federal Government could even have a slight deficit without raising taxes, for all that is necessary is an amendment to the law with respect to the sinking fund on war debts. This provides a cushion. The United States is far ahead of schedule in sinking-fund payments on the public debt, and it could eliminate the $250,000,000 fund in a bad year without disturbing credit in Government securities.

Taxation, however, is not entirely a Federal problem. Forty legislatures will meet next winter; nineteen states have income tax laws already; twelve others are considering them. In many instances where the power to levy income taxes has already been prescribed by state constitutions, there is much discussion as to how the burden shall be distributed. Real estate is clamoring for relief. More taxes for corporations and business, particularly the large units, is the suggested alternative. Trade associations are on the alert in opposition to new burdens.

The horizon of business has some clouds on it, but at the end of more than a year of depression, there is no doubt that the facts of the problem are clearly outlined. This means that the challenge to all business, large and small, to organize efficiently for continued profit has been indelibly written in the management counsels of the nation. And when the major businesses have translated present plans into action— some time in the next twelve months, the beginning of a new period of economic balance will come. And out of it will emerge not necessarily an unprecedented expansion, but an efficient prosperity.

Mr. Lawrence's authoritative comments on current business topics will appear as a regular monthly feature in AERO DIGEST.

AIR OPPORTUNITIES

By Don Rose

NOT long ago I stood on Pitcairn Field, Pennsylvania, in company with a number of other personages of distinction, charm and aeronautical curiosity, and watched the autogiro go through its incredible tricks. It was a nice novelty in entertainment, and the demonstration finished in a thick fog of critical comment, appreciative applause and whiskered wise-cracks from the assembled multitude. After Jim Ray had done nearly everything with his flying windmill except to make it scratch its ear with its hind foot, the audience was invited to form in line for rides. I want it on the record, here and now, that when the call went forth for volunteers and these veteran pilots and experts began to tread on each other's toes in typical modesty and anxiety to let George do it, I was the first to offer myself for a sacrifice to the sacred cause of aeronautical progress. I went up in the autogiro and I came down in it, and I still couldn't tell you how the trick is worked.

Incidentally, this was my first experience with a parachute, the dainty device that is required by a benevolent Department of Commerce for all aircraft that are blighted with the name of "experimental." Apologizing profusely, the management inserted me into a parachute before I was allowed on board. My best friends have since assured me that I am not improved by a parachute. A parachute upsets my center of gravity and seriously depresses my tail assembly. My nose goes up and the slightest push puts me into a stall. But as things stand at the moment of writing, you have to wear a parachute to ride in an autogiro, though offhand I can think of no place where a parachute seems so superfluous.

After the show was over and another thousand miles or so had been added to the flight log of the first American-built 'giros, the surrounding conversation turned quickly to practical considerations. Here and there could be seen wild-eyed gentlemen fumbling for their pocket books, while others sought everywhere for salesmen willing to sell an autogiro for so much down, so much a month, and a trade-in allowance on a partially-used biplane, an OX motor in the original crate and a can of castor oil. At which moment it was suddenly and conclusively discovered that there were no autogiros for sale, that nobody knew how much they would cost if there were, and that production, distribution and popular consumption of these queer craft are matters that have waited so long on technical development that they may as well wait a little longer.

The moral of this tale was contained in a phrase coined by Lieutenant Commander Robert S. Hedtler, who—as you probably don't know—is the chief of the new Bureau of Aeronautics in Philadelphia. He was talking to the Aero Club of Pennsylvania, in monthly meeting assembled. His message was to the effect that the dear old public no longer needs education in air-mindedness; that what the public needs is more "air opportunities."

The phrase is so lucid and self-explanatory that I shall explain it. The Lieutenant Commander was saying, in effect, that the public's willingness to support aviation and make business use of aircraft has got considerably ahead of its opportunities to do so. A swell job of advertising has been done, but at the end of it the product and the customer are still too far apart for anybody to make any money. The public is nearly convinced now that airplanes are safe and swift, that the straight line is the shortest distance between two points, and that a practical flying machine is an extraordinarily useful device for the service of a mechanized world. And when all this is said and done, and the public is panting and perspiring to go somewhere by air, it discovers that there is nowhere to go and no airplane going there.

We shall consider briefly, therefore, the next stage in aviation's history, which is as certainly and necessarily imminent as such things can be. Not that the spirit of prophecy is upon me, for any practical prophet in these days would not be earning a comparatively honest living, but would be leaping around in the stock market and catching it on the bounce. But there are signs and portents which show which way the aeronautical cat is going to jump, and most of them have to do with the rapid increase in "air opportunities," which are just about all we need now to make this a nice business.

I noted last month what happened in Philadelphia and vicinity when somebody laid a few airlines along the logical routes of travel, and busted all the records for passenger traffic. That was the specific example which Commander Hedtler used in expounding his theory of "air opportunities." He paid tribute to those who gave the public a chance to travel by air to a place where people might want to go. The public response to this invitation hardly even hesitated. The lines from New York to Washington, from New York to Richmond, from Philadlephia to Atlantic City and so forth are getting some very pretty business. Moreover, they deserve it.

We have been nationally proud in the past of the annual increases in airline services, which walked away with the world's record some years ago. It seems certain that next year will see the greatest period of airline expansion that the industry has yet known. It is the logical consequence of the settled safety of the plane, the multiplication of airports and the perfection of radio, weather and night-lighting services. It is also the result of the determined invasion of the aerial transportation field by gentlemen who have already managed to make railroads and other forms of surface communication pay their way. In addition, it is the logical outcome of an immediate and pressing need—the need for "air opportunities." For unless air opportunities are manufactured and multiplied, there is at least a chance that this industry may go broke.

We have passed the point where promotion of aviation consists only of *persuading* the public to fly. It is time to assume, for better or worse, that the public is willing to fly, with proper encouragement but no special pleading. Which means, I should say, that new airlines must be provided wherever there is a reasonable expectation of business, that the airways must be developed and routed to match the business map of America, that the industry must go ahead with as much faith and confidence as it has been expecting of the public. The era of education is about over; it is time to test its results with adequate "air opportunities," so that the presumably air-minded public can obey that impulse.

I admit that it sounds something like a counsel of desperation. It seems dangerous to give the public what it wants, when you are not (*Continued on page* 148)

A RUMPUS OVER RECORDS

By C. B. Allen

AMONG the pilots of the country who are interested in making new records or breaking old ones, and particularly among the woman pilots, there is a growing feeling of dissatisfaction over the apparent indifference of the National Aeronautic Association toward these attempts. In some instances, according to the fliers, this official apathy amounts even to an annoyed hostility with the result that the N.A.A. fails entirely in its function of carrying a record, once established, to its logical conclusion of acceptance by the Federation Aeronautique Internationale.

Indeed, some of the disgruntled lady pilots of the land have reached the conclusion that breaking a world record is relatively simple compared to breaking through the hostile inertia of the National Aeronautic Association regarding anything that women may stir up in American aviation. They have about reached the point where they are convinced that all air records are endurance records so far as they are concerned, with the establishment of a new world mark as a mere incident in a long train of events culminating in final recognition of the performance by the N.A.A., provided the pilot holds out long enough. Making a record is easy, they say; making it stick is the real stunt.

Every now and then the daily press reports that Pilot So-and-so has set a new world record for speed, altitude or endurance, and that it will be recognized officially as soon as the instruments have been calibrated by the Bureau of Standards and the results certified to the F.A.I. A few days later the same papers carry a paragraph or so under a Washington date line saying the corrected instrument readings show the record really was broken and the casual, or even specially interested, reader would think that was the end of the matter. But apparently it is only just the beginning. A couple of cases in point:

Last spring, so long ago that nearly everyone has forgotten the flight, Miss Elinor Smith of Freeport, L. I., after the usual announcements and delays, went up at Roosevelt Field in a Wright-motored Bellanca monoplane and set a new altitude record for fliers of her sex. The affair appeared to be run off in quite regular order, with a local representative of the N.A.A. acting as official observer and obtaining affidavits from the usual number of bystanders who witnessed the flight. A barograph carried in the plane was forwarded to Washington with its seals intact, and in due course the Bureau of Standards made an official report showing Miss Smith had reached an altitude of 27,418 feet.

In the weeks and months that have since ensued, a most amazing correspondence has gone on between this pilot and the National Aeronautic Association—the girl striving to have her record officially recognized and the N.A.A. finding one reason after another why they could not certify the performance to the F.A.I. They found fault with the observer's report, though he was their accredited representative; they found fault with the submitted pictures of the pilot and the plane; and finally, a few weeks ago, they found fault with the fact that there had been "so much delay" in submitting this record to the F.A.I. there was grave doubt of its ever being accepted. This, in spite of the fact that responsibility for the delay rested pretty clearly with the N.A.A.

At this time Miss Smith's record still is in the balance. Another mark, the women's refueling endurance record which she and Bobby Trout set a year ago in California, has been lost to her entirely on a decision by the N.A.A. that the records in the case were held up too long by their own representative on the West Coast who acted as observer on this flight and installed the barograph used. All of which, no doubt, is pretty discouraging to Pilot Smith and inclined to make her wonder if she wasn't something of a sucker when she paid her annual dues to the N.A.A. under the impression that the N.A.A. would be a Big Help to a Little Girl trying to Get Along in the aeronautical world.

During the latter part of June another of America's ambitious young airwomen, Miss Amelia Earhart, of trans-Atlantic fame, decided to establish a series of speed records for women. Being a member of the Contest Committee of the National Aeronautic Association, and therefore more than ordinarily familiar with the idiosyncrasies of that body, she exercised particular care to avoid any hitches. The speed course that she was to use at Detroit was approved and a special dispensation even was obtained from the F.A.I. to permit the timing of her flights by the stop-watch instead of the electrical timing method. These and other details having been attended to, she went out, as said before, one day toward the end of June and established three new world records for women—two over a 100-kilometer closed course and one on a three-kilometer straightaway. A local official of the National Aeronautic Association witnessed the flights and another accredited representative timed them. The press, (*Continued on page* 161)

What happened to the records they made? L. to r., Elinor Smith, Phoebe Omlie, "Pancho" Barnes, Amelia Earhart, Bobby Trout

TRANS-ATLANTIC FLIGHTS OF SCIENTIFIC VALUE

By Dr. James H. Kimball

Meteorologist, New York Weather Bureau

TWO of the more recent ocean flights illustrate, perhaps better than any further elaboration in words, what appeals to me as the difference between a "stunt flight" over the Atlantic and a scientifically useful expedition in which a trans-Atlantic flight plays an important part. In my last article I said that opinions differ widely as to what constitutes a stunt flight but that many clear thinkers in aviation assert that a flight lacking in a well-conditioned plane with accommodations for a crew of two and with a flying radius in excess of twenty-five per cent of the distance to be covered, a good navigator who knows his astronomy, a pilot who can fly blind for long periods, and a radio operator who can converse freely with other operators, may be classified as a stunt instead of a serious attempt at adding to the fund of air knowledge.

One of these expeditions qualified under all four counts and the other certainly made up for its lack of radio by a thorough preparation in everything else. The flights referred to are the crossing in the first two days in September from Paris to New York by Major Dieudonné Coste and Lieutenant Maurice Bellonte, the only non-stop east-to-west flight from Europe to New York ever made in a heavier-than-air machine; and the hop on July 8 and 9, 1929, of Captain Lewis A. Yancey and Roger Q. Williams from Old Orchard Beach, Maine, to Santander Beach, Spain, the trail blazed several weeks previous by Jean Assolant, Rene Lefevre and Armeno Lotti, Jr.

The French fliers, Coste and Bellonte—with a record of years of outstanding achievement behind them and in a plane that already had set several world's records—were able to put France behind them, the ocean beneath them and all previous records of the sort in eclipse because they made the most careful preparation, retained extraordinary patience in the face of some popular criticism, and made very clever use of the weather information that was theirs.

It rarely happens over the North Atlantic that weather is at all favorable to a crossing from east to west by airplane. Wing Commander Kingsford-Smith, with a shorter distance to come, elected to try it with much opposition from the winds. The *Southern Cross* got into thick weather off the Grand Banks, and at the same time Captain Saul, unable to take sights, found his compasses acting queerly. Here John Stannage and his radio set went into action with the result that by triangulation on the radio bearings of the plane in relation to two ships the *Southern Cross* located itself, unfortunately after the gas supply had been greatly depleted. In the predicament of the *Southern Cross* radio saved the situation, but Major Coste tried to plan his flight so that he would not find himself in such an awkward spot.

Let us glance at the map of September 1, 1930, the morning of the take-off from Le Bourget. We find fog over Paris and France to the coast, fog over England and some fog over Ireland. Coste had otherwise favorable reports from ships at sea, received from this side of the water and relayed to him through the French meteorological service, but because he did not want to take off that heavily loaded plane with a ground fog, he waited through precious daylight minutes for the fog to lift. It finally did lift enough for him to see the runway and the fields beyond, and the wind was excellent almost on his tail.

Once in the air, Coste pointed straight out under the low ceiling and then over it on a course that took him across Wales near Cardiff and north of Bristol, England—over Ireland near Limerick and out to sea at Latitude North 52, Longitude West 10. In that first 400 miles the red Bréguet flew through several local storms near Ireland and others well off the west Irish coast. A high area lay over the British Isles, with its center in the Irish sea. Around this high area the winds swung clockwise, and the *Question Mark,* hanging to the southern fringe, found thus a helping wind that added some twenty-five miles an hour to its speed, an unusual and exceedingly important aid in this region of prevailing westerlies.

The local storms were not important, but they were annoying. The pilot had to decide whether to fly through them or try to go above them. He knew from his meteorological knowledge that east winds over the North Atlantic were likely to be "thin"—that is, that the higher he went the less helping they would be and that they might disappear altogether not so very far aloft. In this respect he profited by the strategy of Idzikowski and Kubala in their flight to the neighborhood of the Azores in 1928 and again in 1929. Coste therefore hugged the surface and edged north of his proposed course both to escape the local storms and still keep his helping tail wind. For the

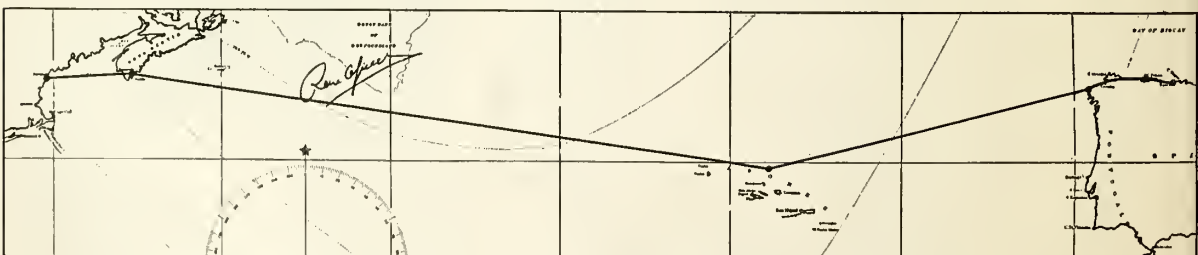
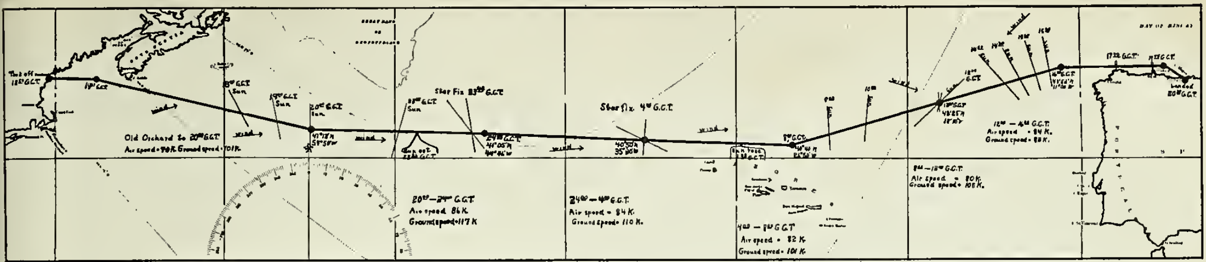


Chart of the course flown by the French trans-Atlantic airplane "Yellow Bird," from the United States to Spain



Course flown by the "Pathfinder," in which Williams and Yancey crossed from Old Orchard, Maine, to Santander, Spain

next 400 miles he flew on this northerly tack until the plane had reached a point placed approximately at Latitude North 53 Longitude West 25. At about this point Major Coste knew that he might expect to lose the advantage of his helping wind moving clockwise around the high pressure area over the British Isles, for it tended to swing northerly instead of straight out of the east the farther he flew away from the area's center, unless of course some other factor entered the situation.

This was precisely what happened, for a low area that left the tropics southeast of Bermuda on August 25 passed west of the islands on the 26th and turned east following the 38th parallel, reaching the Azores on the 29th, whence it turned north at a point almost due south from the plane's position, so that the plane found itself flying along on the northern and western fringe of a cyclone around which the winds blow counter-clockwise. Once more a helping wind. Conditions as the fliers expected to find them were being verified by Bellonte's radio. At all times during the flight, they were in touch with ships or land stations, getting the latest weather information. In between radio messages Bellonte made celestial observations —when clouds permitted. He made twelve of these, and he obtained one radio position on which he was able to check his own observations.

On reaching Latitude North 53 Longitude West 25, Coste and Bellonte had to make a quick decision. If they held on their course as they were then flying, they would probably sight land first way to the north of the Great Circle route and off their course at a point close to where the *Bremen* landed in March, 1928. A more advantageous landfall, however, lay to the west southwest at Cape Race on the southeast corner of Newfoundland whence they could take a bearing for the last long leg to New York. It must have been a temptation to strike for that nearest land but there were obstacles. Off Newfoundland there blew northerly and westerly winds and fog was reported from Belle Isle. They knew of Kingsford-Smith's compass experience and they knew also how far they would be from the steamer lanes. By electing a course that would bring them closer to the steamer lanes, they would also have the continued advantage of the helping winds, but they would not be getting closer to land very fast. In fact, they would be paralleling the North American coast instead of approaching it for the next 1,200 miles, but since they were far to the north, they would be getting closer to New York. The map, on the next page, discloses the conditions better than the printed word.

Coste selected the longer route with the helping winds. The *Question Mark* was pointed south of west—almost southwest, in fact—and skirting the low area moving north from the Azores, the French fliers again rode a helping wind. Their next problem was to decide at what point to turn directly toward the North American coast. For hundreds of miles they held the same bearing, moving steadily southwest.

They crossed Longitude 30 and swung below Latitude North 50, then across Longitude 40 almost down to the fortieth parallel and within a short distance as the airplane flies of the "ocean corner" where the steamship lines between New York and northern Europe turn from a point 1,200 miles out from New York to the northeastward. Here at about Longitude West 44 and Latitude North 41, close to the point previously set for the turn before the take-off by the French meteorologist, Yiaut, they turned almost an exact right angle. They were 600 miles from Cape Race and about 850 miles from Cape Breton Island, and they laid their course for Cape Breton. They had escaped the strong cross wind coming from the north across the Grand Banks and now found themselves in an almost neutral area, still with a northerly wind but not of sufficient intensity to do them much harm. The night of September 1-2 came to an end as they finished the second leg of their trip, and the day they were to reach New York greeted them as they turned at last toward land, flying through clouds and local storms and some fair weather. As they neared Cape Breton they found the wind slightly against them, and on making landfall, they were in low clouds and the thickest weather of the whole flight. After taking a land bearing, they turned southwest over Nova Scotia. They flew as low as thirty feet at times and at all times were below 5,000 or 6,000 feet, keeping generally at the 2,500-foot level.

As they approached the southern boundary of the peninsula, they turned due west for the mainland and from the Maine coast they came on to New York, flying sometimes over land and again nearly a hundred miles at sea, flying sometimes at 2,000 feet or more and again coming down to thirty feet.

Summing up this flight, we find that the *Question Mark* had easterly winds a great part of the distance. We find also that Coste and Bellonte flew the ocean for the most part while it was clouded over, and often they flew absolutely blind through thick white mist.

It was the Coste strategy to dodge storms; and knowing that easterly winds are generally, as I have said, thin winds, he found it necessary to fly at a low elevation either going through storms or around them. He chose the low altitude and he chose whenever possible to avoid the local storms by going around them, not over them. It appears to me that he used the only rational strategy for an east-to-west flight on that particular course. He was helped in this strategy by his radio, and it is safe to say that he could not have achieved as he did without the radio. It is remarkable to note that Coste and Bellonte, according to their own log, were never more than ten miles off their dead reckoning course. The weather was as they had been advised it would be, and they were able to fly almost exactly on the course they and the meteorologists had plotted before leaving France.

In closing my comment on the flight of the *Question Mark,* I would like to quote the great French flier himself:

"If others who have attemped to fly from Europe to New York have failed, the chances are that it was because of lack of adequate preparations. I cannot stress this too much. Others have taken off with an excess of courage and a lack of reflection."

We come now to the second flight under discussion. Williams and Yancey had no radio set, but they made up for this lack by their plan of campaign. Both men were well equipped by training and natural endowment for the task that was theirs. Their Bellanca plane and Whirlwind engine offered as nearly perfect flying equipment for the job as they could get. Without radio there were no means to obtain weather data after the flight started, and so they planned their campaign to get along without the message service.

Planning to fly a straight course, they knew that they would have to fly through much fog and clouds. They knew also that the best winds from the west were most likely to be found aloft, so they decided to fly high. With these plans in mind, they set about their preparations. Williams was already an accomplished pilot well able to fly blind. Yancey, an experienced navigator, could be depended on to keep the plane on the course.

While waiting for weather, these two men spent 130 hours in the air flying blind. They flew perhaps 20,000 miles just in training for that flight. They welcomed every bad day and took their plane into any cloud and any fog extensive enough to give them instrument flying experience. They flew straight and curved and triangular courses in the "soup" by instrument alone, and when the day came for the take-off, the knowledge that within a few minutes after leaving the sands of Old Orchard Beach they would be in fog and clouds did not worry them.

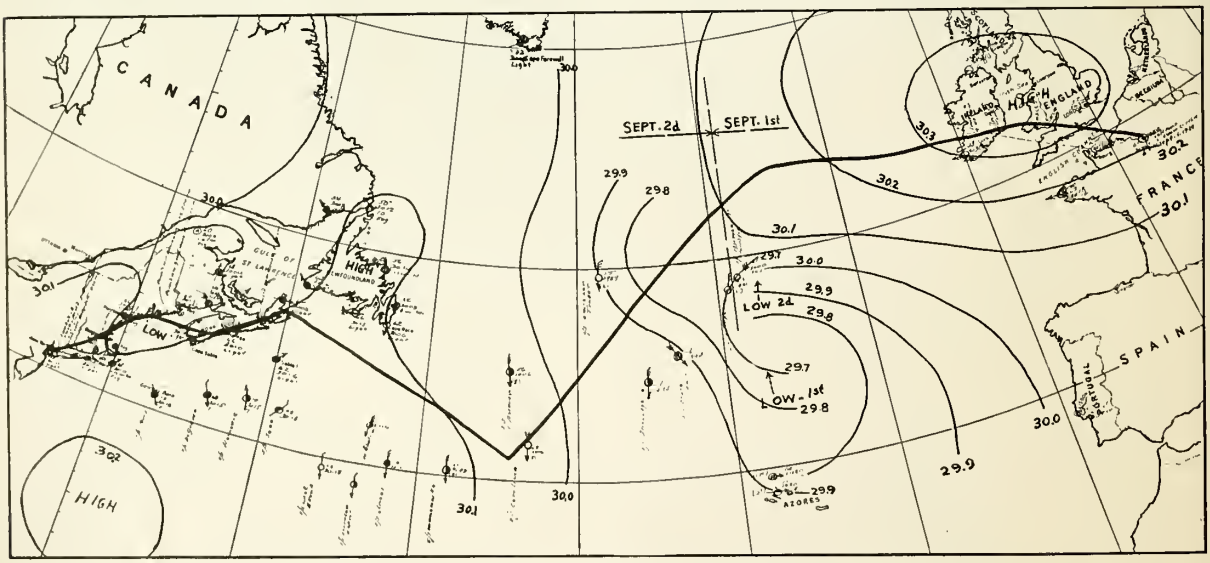
Setting out from Old Orchard at about eight o'clock in the morning, they climbed to 600 feet, throttled their engine and pushed slowly through the fog, climbing a little all the time for nearly an hour, flying a dead reckoning course due east. At 1,200 feet they got through to sunlight and the opaque blanket beneath was so complete that they gave up a plan for obtaining a final bearing off Cape Sable. As a matter of fact, they flew to the south of Cape Sable. Four hours after the take-off, Yancey took an observation and fixed his position. Into the fog they went again, and still climbing, they were out an hour later at 3,500 feet. Yancey took another observation, fixed his position, and eight hours after leaving Old Orchard Beach the plane was flying easily, with decided help from the winds, on a course almost due east at 41 North and 54-50 West, right on the steamer lane.

Two hours later the sun set, and Yancey reported that, although the night was clear, it was very dark and, in spite of some semblance of a horizon line, blind flying became a necessity.

Morning found them right on their course at 4,300 feet, flying over a white blanket and riding a good wind. During the morning they continued to climb to 7,500 feet, getting better wind as they went along. And finally in search of stronger currents at 11,000 feet they leveled off. A minor mishap slowed them considerably, ripped fabric on the bottom of the fuselage, set up a drag that cut their air speed many knots and used up the reserve supply of fuel which they carried in hope of reaching Rome or to provide against just this sort of unforeseen emergency. As we all recall, they landed at Santander Beach, Spain, still with some fuel left but not enough to go on to Rome.

Williams and Yancey, like Coste and Bellonte, made a plan based on the best information available and a thorough understanding of the problem and the tools they had with which to solve it. Then they followed this plan through to a successful conclusion. Their strategy called for high flying, depending on the winds which they had a right to expect and which they found, and a straight course that made blind flying essential.

It was a business-like performance. Like that of Assolant, LeFevre and Lotti, Captain Yancey's log, together with his observations on conditions along the route, is in my opinion a real contribution to our store of knowledge of ocean flying.



Weather map and course chart of the Coste and Bellonte westward flight from Paris to New York

THE FUTURE OF TRANS-ATLANTIC AVIATION

By Major Dieudonné Coste

WHAT is the future of trans-Atlantic aviation? Naturally that is a subject I have often pondered. I do not like to generalize in a field in which one man's prediction is as good as another's; but I have, of course, some hunches.

I believe that the airplane is more serviceable than the dirigible; that when trans-Atlantic air routes are inaugurated on a commercial basis the flights will not be non-stop, as ours was, and that the huge Do.X., in which the Germans propose to carry a payload across the Atlantic, will be found to be too large for practical purposes.

All these opinions center in one problem, that of speed. No one is going to make a success of commercial trans-Atlantic aviation unless he can provide reliable service at a very substantial saving of time over the four or five days in which the express ocean liner now makes the crossing. My guess is that forty hours is the minimum that will pay. If aircraft cannot provide reliable forty-hour service, they are beaten before they start.

Right at this point the advantage of planes over dirigibles begins to be seen. Dr. Hugo Eckener has done marvels; he has shown the Zeppelin to be safe and sturdy; but, as yet, he has not been able to cross the ocean in the face of adverse winds at a speed greatly in excess of a fast ocean liner. If a trans-Atlantic dirigible service were to operate steadily for six months or so, I think that this shortcoming would become extremely evident.

The airplane, on the other hand, has sufficient speed to overcome strong adverse winds. It will be pointed out at once that the dirigible has the advantage of being able to remain longer aloft, even after its fuel is exhausted, whereas all trans-Atlantic airplanes to date have had to carry so much fuel that room remained for little else.

It is for this reason that I believe trans-Atlantic air service will include quite a few stops. These stops may be made on land; they may be made on floating airdromes such as I understand to be under construction here in America. They will enable the plane to carry a payload large enough to provide real profit.

When any trans-Atlantic service is inaugurated, mail will be its mainstay during the long period of demonstration that will be required to convince most people that it is a safe mode of travel. This has something to do with my opinion that medium-sized planes, much smaller than the Do.X., will be used.

So much time would be lost in waiting for a profitably large cargo of mail to accumulate—a cargo large enough to load the Do.X., for instance—that steamships could give nearly as good service. Would it not be better at first to have a number of smaller planes flying at short intervals and fully loaded than a few large planes?

This brings us to the much-debated question as to the relative reliability of small planes and large multi-motored planes. An airplane is dependent upon the steady functioning of its motors just as a human being is upon his heart. Airplane motors are among the finest products of pure science. They are approaching the point of being utterly reliable.

If we are to regard the airplane motor as a perfected machine—and it is hard not to do so after listening to the never-failing drone of our Hispano for hour upon hour as it pulled us through the mist over the Atlantic—we are forced to the conclusion that even a single-motored plane is at no disadvantage in comparison to the largest multi-motored craft.

But I do not want to give an impression that I take for granted the early establishment of air service between France and the United States. It is not impossible, but, in reality, much work is necessary before it can be accomplished. We must have more information about meteorology over the North Atlantic and about the materials used in airplane construction.

Our flight, I feel, brought out big things, not so much about meteorology as about conditions under which the various materials used in a plane can be depended upon. These technical matters will be of interest to airplane designers.

And as to what the flight proved relative to long-distance travel over water, here is the thing I realize full well—that it is a handicap for commercial aviation that the dead weight of fuel should eat up the room that might otherwise be used for a payload.

We flew across, arriving at the exact destination which we had determined upon. That is a thing to make me very happy, but I am still quite aware that the flight comes far from proving the present practicability of commercial service over the same route. We must have better planes and plenty of landing stations of one kind or another en route, enough, at any rate, to enable us to dispense with some of our gasoline and replace it with payload, comparable to that of the airship.

This would seem to be a concession to dirigibles. Nevertheless I maintain that their performance is not yet convincing. Their inferior speed is not their only handicap. From a practical standpoint they have another one that will still remain, even if the speed can be stepped up to a point where it compares with a plane. This second handicap is the cost involved, not alone in the construction of the ship, but also of the huge hangars required. And, beyond that, a large ground crew must be maintained. Until now there has been a great struggle between these two types of aircraft, but, despite the splendid voyages of the *Graff Zeppelin* and the R.100, I think the airplane still has the upper hand. The dirigible can do things the airplane cannot, but the use of landing fields ashore and afloat will offset this. Eventually, of course, direct flight will be the thing.

I realize that the ability to make a direct flight is just the goal at which the designers of the Do.X. aim.

But airplane designers must not make the same mistake as is found in the dirigibles; they mustn't build their machines so large that the expense of construction and operation eats up the profits.

That is just a simple business consideration; and it is my reason for believing that the Do.X. is too large for practical purposes. Of course it constitutes an extremely interesting scientific experiment, and I admire those who are working on it.

We should never forget that safety must always be placed ahead of every other consideration if trans-ocean flying is to be a business success. Speed with safety is the problem and only the future can solve it.

SURMOUNTING NEW GUINEA'S NATURAL BARRIERS by AIRPLANE

By "Gold Seeker"

NEW GUINEA, the great island which sprawls across some sixteen hundred miles of the western Pacific, due north of Australia, is a fascinating country—and one of the most difficult parts of the world in which to travel. For the past thirty-five years it has been the scene of much strenuous work by the gold seekers who have hacked their way through its steaming jungles and penetrated far into its maze of towering mountains. Gold hunting anywhere is no rest cure, for the search for the precious metal is always associated with much discomfort and hardship; but in New Guinea it is even more difficult than in other countries, because the only method of transport in the interior is by native porters. Consequently, when the miners discovered the rich auriferous deposits on the headwaters of the rivers flowing into the Huon Gulf, on the northeast coast of the island, they speedily decided that aerial transport was the only method of quick, reliable and economical communication between the goldfield and the coast. Australian pilots surveyed the airway from the coast to the interior; landing grounds were cleared along the route; hangars erected; and a freight and passenger service was soon operating from the base at Lae, seventeen miles across the bay from Salamoa, the port for the new goldfield.

An airplane on the beach at Port Moresby, Papua, arouses curiosity.

The new method of transport astonished the miners. The journey from the coast to the gold-field, which had formerly meant an arduous ten or twelve days' march over the precipitous ranges, became a comfortable hop of about fifty minutes! The planes charged twenty-four cents a pound for freight, and a hundred dollars a passenger, for the trip to the interior; on the return flight to the coast the fare for a passenger was fifty dollars. These rates were not excessive, however, for the old method had cost much more, despite the fact that it was very slow, full of much manual labor, and subject to interruption by the weather. The planes landed their cargo in perfect condition, whereas the old man-pack service often suffered losses when the torrential rains spoiled the rice—the staple food of the miners and their labor—and other perishable articles en route, to say nothing of the unavoidable loss and delay caused by flooded rivers, sickness, overturned rafts and other causes.

The native porter could carry only a fifty-pound pack, which weight included his food, so that after completing the ten days' journey he landed only some thirty-five pounds of freight at his destination. This meant that the miners had to employ three natives on the trail for every man they had working their claims. The aerial service, consequently, cut down their operating costs by freeing them from the heavy expense of maintaining a transport team, as well as enabling them to utilize in their claims the labor formerly used for transport. Within a very few days after the aerial service started to function, every miner on the field was an ardent supporter of the new idea.

Another thing that made the planes welcome was the relief they brought to the monotony of life in the jungle. Mails, food, radio communication with the outside world, formerly dependent on the old irregular and very unsatisfactory man-transport, now became a daily event; if a man had business to attend to at the coast, instead of a three weeks' tramp through dripping jungle there and back, he simply stepped aboard a plane and did the trip comfortably in a few hours. The standard of living on the goldfield was also improved by the new service; the daily menu was no longer rice and canned "bully-beef" and other unappetizing food. As a result the general health of the miners and their native employees became better. Heavy articles of machinery, necessary for the efficient working of the claims, which formerly took months to transport by the ground route, now came in without delay; the sick, who formerly had to be carried to the coast, often for most of the way in pouring rain, now were whisked there in a few minutes. The aerial service absolutely revolutionized conditions on the goldfield—and did it far cheaper and better than the miners had ever dreamed of. Miners are usually rather conservative people, but before a week had passed, after the first machine had inaugurated the new system of transport, every man on the goldfield was air-minded. Week-ends on the coast became popular; most of the miners were on rich claims, so that cost of transport did not bother them.

The service was started with English machines, craft that had a payload of 500 to 700 pounds, but as the freight increased larger machines came into use. Soon several outfits were competing for the trade, with the result that the rates charged were reduced to eighteen cents a pound for freight, with a corresponding cut for passenger traffic. American and German machines appeared, the latter of the all-metal type and able to transport a 1,500-pound payload. These all-metal machines stood the rains much better than those with fabric wings. Moreover, because they could be operated much more cheaply, several of them were soon in regular service.

The landing fields, especially in the interior, where the rainfall is very heavy—more than 200 inches a year—are often very soft, hence it was not surprising that a few accidents took toll of the machines there. Several of them, while landing on the muddy ground, bogged their wheels, went head over heels, and were badly damaged, but the pilots and passengers always escaped without injury. One machine, while returning to the coast, conked out with a choked fuel-line. Since there was no other spot within gliding distance, the pilot had to pancake her on the roof of the forest. The plane was damaged beyond repair, but the pilot got off without a (*Continued on page* 156)

Jack O'Meara testing the soaring terrain at South Mountain, Elmira, New York *Photo by Bramwell Terrill*

"SWING LOW, SWEET CHARIOT"

By

Cy Caldwell

THE peculiar tendency of the human race to travel in circles frequently has been remarked by the more observant. Man individually, starting life as a mewling infant without teeth, strength, understanding or the capacity to go places, invariably—if he lives long enough—ends up in pretty much the same condition in which he found himself at the start. He travels the cycle of life, sometimes with grace, vigor and dignity, but finishes as a childish old codger minus teeth, strength and the power of movement. If he gained any sense during the journey, he invariably loses it before the end and departs this life an infant in all but appearance, thus completing the cycle.

To find aviation revolving with great clamor and dignity in a circle of its own therefore is not surprising: it is what the thoughtful observer would expect. Heaver-than-air travelers started out some forty years ago aboard a glider; and now, in the year 1930, they are getting aboard the glider again, thus completing the cycle. Aviation in the meantime has learned to crawl, to walk, and finally to run—by which I refer to the development of powered flight from the first few reluctant pony power to the hundreds of horsepower harnessed to the modern airplane. But nevertheless a part of aviation already has reached its second childhood, has lost the power of movement, and now must be carried around, either by the strength of man or by the lifting force of the air currents. It's right back where it started from.

All of which was demonstrated and made plain to me as I stood shivering on a wind-swept hillside near Elmira, New York, on the last two days of September. On that bleak hillside were gathered, complete with chilblains and goose flesh, those interested in watching aviation don again its swaddling clothes, to be nursed tenderly by man and the elements. The elements, by the way, were somewhat careless of the old infant—they dropped it on its nose a few times. But of that more anon.

The event that hurled me—and "hurled" is the right word to describe the progression of one clinging limpetlike within the grim confines of a Lackawanna sleeper's upper berth—the event that hurled me into the peaceful and windy environs of Elmira was the National Soaring Competition sponsored by the National Glider Association.

When Sherman Voorhees invited me to come to Elmira if I could find it, I accepted at once, for two reasons. First, I had never seen any soaring—except the flights of fancy embarked upon by air-stock salesmen some two years ago; and second, I seldom miss an opportunity of going anywhere as a Paid Watcher—to see all, know all, meet all, and toil not.

As things turned out, I enjoyed myself so much that I am determined not to miss another soaring meet, even if I have to pay my own way. However, there's no use bringing up an unpleasant possibility like that. So long as the amiable custom of sending Paid Watchers about the country prevails, I hope to continue as one of the tribe, along with Louie Ross of the Cleveland Pneumatic Tool Company, who represented at Elmira the Cleveland Local of the Paid Watchers' Union.

But before I jog along to the meet itself, I must say a few words about gliding and soaring, so all you six readers will know what I'm talking about. In discussing gliding, and especially soaring, even with experienced airplane pilots, I have encountered a general lack of knowledge of the subject. The prevalent impression seems to be that to glide or to soar one merely sits in a contraption without a motor, and leaves the rest to the wind.

Gliding is the art of coasting down hill on the air, and constantly losing altitude in order to maintain forward

speed. Soaring is the art of taking off from a certain point, and seeking advantage of ascending air currents to gain altitude and to sustain that altitude for periods of from several minutes to many hours. The distinction is evident, but I shall emphasize it as I go along, for I believe it is not yet generally recognized in this country.

Hans Richter flying an original Lilienthal glider

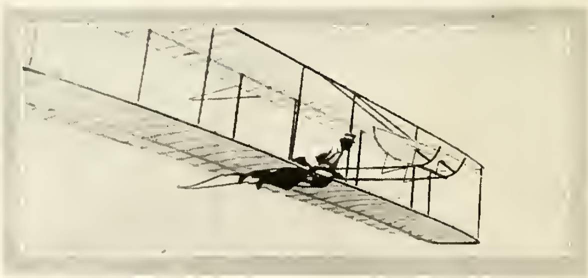
Gliding is comparatively simple; with caution and common sense I believe that almost anyone may glide, and glide safely. Soaring, on the contrary, demands a high degree of skill. It demands it, but doesn't always get it; in which case the soarer automatically becomes a glider, a spinner or a subject of speculative interest to the medical fraternity.

So much for the art, as I must be brief. Just a word of history. Believe it or not, but the Wright brothers were not the first men to fly in heavier-than-air machines; they were the first to fly with power. The honor of being first to leave the ground in a machine that weighed more than the air it displaced must go to the early glider experimenters. Probably the first of these was Elijah, who, it is alleged, went to Heaven in a chariot of fire. But as he was not carrying a sealed barograph supplied by the Contest Committee of the N.A.A., we cannot regard that flight as official.

I quote from the U. S. Department of Commerce, Aeronautics Branch, Bulletin No. 22 on Gliders and Gliding: "While the glider was in existence in one form or another prior to 1890 . . . it would seem the art, science and sport of glider operation may well be dated back to just a few years before the dawn of the twentieth century. Otto Lilienthal, of Germany, one of the outstanding pioneers in gliding, between 1890 and 1896 made many successful flights with gliders, covering distances as great as 1,000 feet from the point of take-off. With the glider, he was in search of what we have today—the airplane. The glider was regarded as the stepping-stone in the eyes of those pioneers, and a correct and reliable stepping-stone it proved to be.

"While Lilienthal was conducting glider experiments, others interested themselves in this form of flying. Among those whose work is a matter of history are Percy S. Pilcher of England; Voisin and Farman, of France; and John James Montgomery, Octave Chanute and A. M. Herring, of the United States.

"In 1900 the Wright brothers constructed and flew gliders to aid them in their search for the realization of their dreams. The Wright gliders appear to have been the first in which the landing gear was employed. These gliders used skids which are standard equipment on many of the present-day types. The skids obviated the necessity for using the feet in landing, which was a feature of the 'hang type' then in vogue. The 'hang type' called for the suspension of the glider pilot from his armpits, in order that he could use his feet as power for taking off, as a means of alighting on the earth, and as a means of balance in the air."



Wright glider in flight at Kitty Hawk, N. C., in 1902

I thought it better to drag the Department of Commerce in to give you the low-down on those Early Birds who aviated in the "hang type" glider, because I had a faint suspicion that you mightn't believe *me.* Of course, pioneers are always venerated and made much of, and it is the custom to speak of them with reverence, but to me it appears that those now extinct birds who either piloted or piled up the "hang type" of air sedan had all been dropped on their heads in infancy.

However, it was that individual who developed the glider, from which the Wrights evolved the powered airplane. So we must give him credit for his very considerable share in the progress of aviation. In fact, we should never decry the efforts of anyone; some good may even emerge from the Senate eventually.

The discovery of the practicability of powered flight put gliding rather in the shade, although in 1911 Orville Wright returned to Kitty Hawk with a glider to conduct further experiments on automatic stability devices for airplanes. During those flights he established a duration record of nine minutes and forty-five seconds—a record that remained unbroken in the United States until 1928. In 1912 a glider camp was established at Rhön, Germany—since famous for its soaring—and until 1914 there was some little glider activity in the United States. But the glider men gradually moved on to powered planes, the war came along and moved us all on—and some right under—and gliding was forgotten here until 1922, when the Massachusetts Institute of Technology formed a glider club, by special permission of the Watch and Ward Society, without which practically nothing can be done in Boston, city of the saints.

It was a member of this club who visited the Rhön competition and discovered that the Germans, contrary to general belief, did not devote themselves solely to the consumption of beer and pretzels. Some few of them, it appeared, had been busy developing gliders into soarers, with such happy results that they could leave the earth without an engine, or even a qualm, and stay away from it for hours and hours. They returned only when the pangs of hunger informed them that it was time to partake of the evening meal of *hassenpfeffer und pumpernickel,* washed down by deep draughts of *Münchner brau.* One of them seized a *wiener schnitzel,* went aloft, and stayed all night; another soared some ninety miles, and only landed then because he had run out of beer.

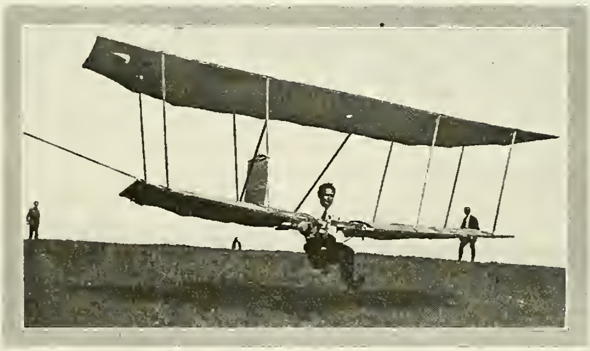
The American, impressed, returned home with tales of soaring. Nobody believed him. The general impression was that he had been overcome by the beer. Then, in 1928, several German glider experts descended upon Cape Cod, where one Peter Hesselbach established a duration record of four hours, which has been forgotten because nobody could remember his name. However, a startled

aviating populace over here learned that there was something, after all, to gliding and soaring. And at about the same time the great American public stopped buying airplanes in the soul-satisfying quantities in which they had been buyng them in the past, upon which the American airplane factories, pained, hurt and grieved, turned in desperation to building gliders. And so gliding survived!

Which brings us down to 1930, and on top of a hill near Elmira, New York, watching Jack O'Meara hurled aloft in a Baker-McMillen glider to soar for hours. This type of machine, like the Franklin "Utility," is a combined primary and secondary glider. It is a monoplane, enclosed fuselage, with the pilot tucked snugly—very snugly—in the cockpit, which is right up in the nose where the engine would be placed in a small high-wing monoplane. In fact, the pilot's weight performs the same function that the engine of a small plane would perform in holding down the nose.

But let me make one point clear. You can glide in a soarer, or soar in a glider, yet the two machines are different; a glider is really built for gliding, and a soarer for soaring, yet each, under certain conditions, will perform the functions of the other. While it is possible to soar in a primary glider under conditions of perfect terrain and winds, the secondary or soaring glider is needed for most locations.

These secondary, or soaring gliders, with the Bowlus Sailplane and the German soarers, were the only types represented at the meet. The Akron Kondor was represented by the wing and the rear half of the fuselage laid sadly in a hangar. The front half, accompanied by my poor battered friend, Dr. Klemperer, had been distributed over the landscape earlier in the meet, before I got there. You apparently have to arrive early at these soaring competitions if you want to see all the planes—as the affair progresses, the competition between the skill of the pilots and the roughness of the ground becomes fiercer and fiercer, with the final decision going to the ground. Hawley Bowlus had fought a good fight, also before I got to the ringside, but he had ended up somewhere over the ropes, with his Sailplane draped over his shoulders like a towel. He and the Doc were both being rubbed down by their handlers when I arrived. It seems that first you soar, then you're sore.



Aviating in a "hang type" glider

All of which made me very thoughtful—very thoughtful indeed. I had gone up there, boldly enough, with a helmet and goggles; I had it in mind to do a little soaring. I say I *had* it in mind. I never did get it off my mind by doing any soaring myself. I decided, almost instantly, to remain a Paid Watcher.

You see, I have done a little gliding along an airport. I sat in one of those rather candid, open-faced affairs where there's nothing between you and the ground ahead but a determined expression on your face. And I had been shot into the air by a group of earnest young men heaving on a shock cord. I found it very simple and quite pleasant. I rather missed the engine but got along without it. I merely zoomed up to about thirty feet, registered mild surprise at finding myself in that position—and glided down to a good landing. I came to the conclusion that gliding was an easy and inexpensive way for anyone to get into the air. And not only to get into the air, but also to get down to the ground again in one complete, unflurried, undamaged section.

Now please understand me plainly, you young gentlemen who are taking up or who are planning to take up the conquest of the air aboard a glider. When I say that I found that open type primary glider safe and pleasant, I mean and write plainly that I found it safe and pleasant for the type of gliding I was doing in it—not for the type of gliding many are essaying with that kind of glider. I was on and over a smooth field, I was only a few feet in the air. I was shock-cord launched, and would have allowed myself to be auto-towed had it been suggested. But—and this is a very important BUT—I would not have gone above thirty feet high in that type. I would not have been towed at break-neck speed. In short, I would have flown that glider with the knowledge that it was not the best design of flying machine in the world, and that its control was certainly not of the best.

I include in these remarks all open primary gliders; and I do it after discussion with many well-known glider pilots of experience. The control is somewhat ineffective and uncertain under some conditions; the crudeness of the design, the lack of streamlining that would insure a smooth flow of air about the rudder and elevators, are visual proofs that control could not, by any stretch of the imagination, be considered as good as that of an enclosed fuselage type.

Nor is it. The only thing the type has to recommend it is its cheapness; actually, it is the crudest device on which one may get into the air. Still, for primary work the thing will serve. Only, don't make the mistake of imagining you are in a soaring plane, or a really controllable secondary glider. Stay low. If you have trouble and crack up, the worst souvenirs you then should collect would be a few bruises and scratches which you may exhibit with pride to the girl friend. You can get bruises in a glider that look just as well as those Henry Brown collected from a Lockheed. And if you have a dog aboard it may leave you just as fast as Tailwind left Henry.

But I digress. Getting back to Elmira, I had my helmet and goggles ready to do some gliding. I thought I'd be able to follow my primary gliding with a few coasts down a hill in a secondary, after which I should be ready to try soaring. That is the correct, in fact the *only*, way for an airplane pilot to get safely and sanely into soaring. It is merely over-confidence in himself and poor judgment that urges a power plane pilot to step into an airplane with no engine (which is what a soaring glider or sailplane is) and allow himself to be catapulted over a cliff. He finds himself in the air, suddenly, in a machine quite unlike any powered airplane he has flown. And often he makes a mess of it.

The wind conditions at Elmira during my stay were such that the boys flew from a hill which they designated as "No. 6" where they were launched down the slope, 800 feet above the valley, had to turn instantly at right angles, and immediately avail themselves of the up-currents. It was skillful work, requiring previous familiarity with the machine. I hoped to get that experience on what they called a secondary hill, where I could merely glide down, turning to right or left, and thus (*Continued on page* 162)

ELMIRA, AMERICA'S WASSERKUPPE

The First National Soaring Competition in the United States

By R. E. Dowd

AFTER a few brief years experience with the modern glider in America, the First National Soaring Contest has been conducted with outstanding success. September 21st to October 4th were important dates in American glider history. Certainly a contest which can boast of "sandwich refueling," formation flying, spot landings measured only in inches, 1,500-foot altitudes, and seven-hour durations, is an achievement worthy of review.

Under the auspices of the National Glider Association, with Manager Donald F. Walker in charge, the terrain was selected, contests arranged and a highly successful meet run off. The whole event was nicely scheduled as to time inasmuch as American glider pilots already had had an opportunity to acquire experience in their respective localities and were brought together for the first national event while their interest was still keen and active. The meet further served to convince the American aircraft industry that the glider is not necessarily a new grass cutting appliance for airports but a highly specialized type of aircraft which has real possibilities when used in its proper sphere of action.

It is almost unbelievable that such excellent soaring terrain as found at Elmira, New York, could be located a little more than 200 miles from our great metropolis. Unlike many proposed sites, Elmira is conveniently situated for a great many surrounding cities.. Among these may be mentioned Buffalo, 156 miles; Binghamton, 64 miles; Rochester, 117 miles; Albany, 210 miles; and Scranton, 119 miles.

Credit for the selection of the site must go to the National Glider Association and more particularly to Dr. Wolfgang Klemperer, chairman of the technical committee of that organization.

After a preliminary survey of the section through the the South Mountain site, which Jack O'Meara used in his terrain from the air, using a powered plane. Likely looking locations were spotted on a map and later visited by automobile. In this manner some ten to twelve locations were established and numbered. Prior to the contest only one location had been actually tested for soaring. This was the South Mountain site, which Jack O'Meara used in his flight of over one and a half hours a few weeks previous to the meet. Before the contest had finished six or seven different locations were used, depending on the direction of the winds from day to day. The take-off points were found readily accessible through a network of dirt roads which cover the hills. In fact, automobiles and trailers were used without exception to convey the equipment to the several locations. Many flights terminated at the starting point without difficulty, while others finished by gliding into the fields of the valley or the airport.

The city of Elmira, which has rather suddenly become famous as a soaring center, is a bustling little upstate community in the Chemung River valley, almost completely surrounded by ridges and small mountains. The city has a population of about 50,000, and one gathered the impression that community spirit runs high, for there was no less

Personalities at the Elmira meet: Upper left, A. P. (Duke) Artran of the Franklin company; center, Major Purcell (with writing tablet), Wolf Hirth, Jack Herrick and Duke Artran; right, Jack O'Meara standing beside the Akron Kondor. Lower left, Capt. Frank M. Hawks, in the cockpit of the Franklin glider, with Wally Franklin; right, Ken Doe ready to take off.

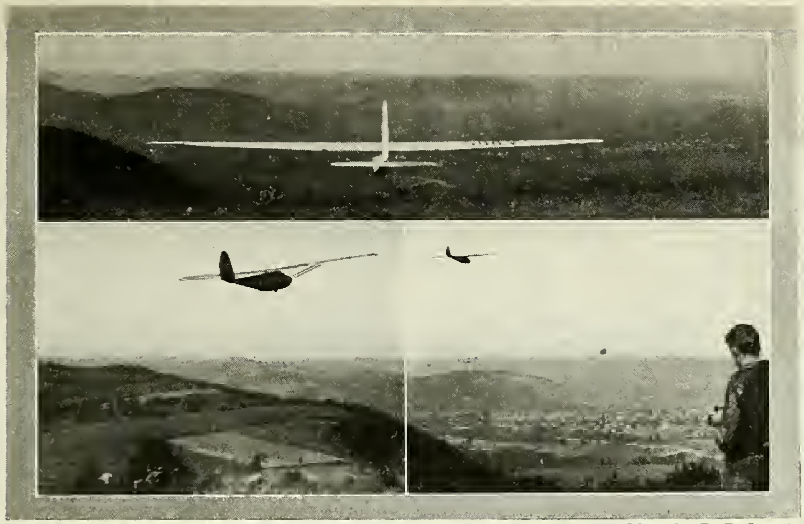


Photo by F. T. Loomis
Scenes at Elmira: Upper, taking off for a soaring flight; lower, two stages of a flight by Captain Hawks, in his transcontinental Franklin glider, the "Eaglet"

than that number of boosters for the glider event.

For centuries the winding Chemung River has been working silently, cutting its way through the hills and carrying surface water on its way to the ocean. This extensive erosion is doubtless responsible for the exceptionally fine series of ridges, which have permitted the site to be called "America's Wasserkuppe." It was these hills Mark Twain loved so well that he made his home among them.

At the beginning of the meet, the first soaring attempts of certain pilots were marked with constant attention to the controls which, in some cases, seemed to be a continuous series of over-controlling, first one way and then the other. After a few hours experience had been acquired, however, these same pilots flew with remarkable smoothness. In fact, one could watch for many minutes at a time before any movement of the control surfaces could be detected and then only to a very limited degree.

In glider flying there seems to be a natural tendency to over-control because of the time interval that is required to bring about a change in flying altitude of the machine. To one accustomed to the quick control reactions of a power-driven plane this period seems excessively long, and the degree of control is naturally increased before the first reaction is felt.

Such pilots as Bowlus, Hirth, O'Meara, Captain Hawks and others, who had a greater background of glider experience, just took off and soared without any apparent "rough" period. Others seemed to go through the "wearing in" stage, during which they either increased their own confidence in the stability of their ships or just naturally tired themselves out and became less vigilant on the stick and rudder bar.

In the later days of the meet the relaxation enjoyed by the pilots in flight took on an amusing aspect. All sorts of trick horns, whistles and duck calls were carried aloft by the pilots and they engaged in a large scale musical frolic as they cruised gracefully along. The Akron Kondor gave out a sharp "tick, tick, tick," as it passed overhead which had the observers on the ground puzzled for a time. It was later discovered that a strip of plywood covering the wing panel connecting point was loose and was slapping the surface of the wing, which acted as a huge sounding board.


Flights at Elmira: Wolfram Hirth, German soaring expert, flying his "Musterle"; left inset, Jack O'Meara in the Akron Kondor soaring over South Mountain; right inset, Franklin PS. 2 in flight

The antics of this squawking, tooting, quacking and ticking flock of soarers seemed to relieve the tension of the observers as well as the pilots.

On Saturday, September 21st, the contest opened with twenty-four pilots and fourteen machines entered. It is significant that of this number of machines only four were of the soaring or sailplane type, the remaining ten being the so-called secondary, or as they are being called in America, utility types. The soarers were the Bowlus Sailplane, the Akron Kondor, the imported Kegal of Hirth, and the Schloss Mainburg type of Haller. The utility types seemed about evenly represented by Baker-McMillen Cadet II and the Franklin machines.

The first contestant to take the air was Jack O'Meara in his Cadet II. The wind was exceedingly low and the flight terminated at the airport more than a mile distant. Late Sunday afternoon, just before sunset, Wolfram Hirth, famous German soaring expert, took off and made a flight just short of an hour. The landing was made after dark at the airport with the aid of bonfires. For a time much apprehension was felt for the visiting pilot since he was lost to view soon after the take-off.

The meet now began to get its stride and on Tuesday, September 24th, the contestants were keyed up ready to try for some real records. W. Hawley Bowlus arrived at the airport, but his machine was still in transit. Jack O'Meara was at the airport hangar early, impatiently pacing back and forth, watching the wind sock and anemometer for encouraging wind indications. His mechanic was grooming the fifty-foot span Akron Kondor for the day's work. Before long the Kondor was on its way up the winding road to South Mountain. Jack had seen evidence of about a six-mile wind and though others doubted its value for soaring, he decided to try it.

An hour later a good-sized gathering had assembled at the take-off point and the trim

(*Continued on page 158*)

AIR—HOT AND OTHERWISE

Pritchard Slips

Again the Air Mail

By Frank A. Tichenor

ONLY a few of us are in what may be called the journalistic end of aeronautics. When but a few thus associate themselves with any worthy activity, it is much to be desired that that few shall be select. The appearance of loose thinkers, loose talkers and loose writers among the publicists of aeronautics must be counted a misfortune. Not great, perhaps; not, for instance, as bad as a severe attack of 'flu. But still a misfortune. Of about the magnitude of a mild case of chickenpox; and the good are as likely as the bad to get the chickenpox. Or, perhaps, as harmful as the eating of a senile oyster. But that gnats will attempt to learn to swim in soup does not discourage mankind with regard to soup. That flies occasionally become immersed in and impair the preciousness of the most perfect ointment is a fact embalmed in philosophic literature.

I do not suppose that aeronautic journalism should expect complete immunity from similar misfortune.

Western Flying is a monthly issued in Los Angeles.

The alphabet becomes dangerous when it spells hasty words. The art of writing and processes of publication become subversive to their principal utility, which is the spread of public intelligence, when they circulate inaccuracies. When they serve the greed of malice to do harm, they need to be abated under the General Nuisance Act.

A recent editorial in *Western Flying,* captioned "Officers, But Not Always Gentlemen," said in part: "After attending functions at which the Army Air Corps was present, the conviction grows that prohibition ought to be enforced more vigorously and that Smedley Butler ought to join the Air Corps. If civilian transport pilots conducted themselves publicly as Army pilots commonly do, they would lose their jobs. . . Getting drunk and making a general ass of one's self in public reflects no credit on the Army and does irreparable harm to the industry. The high command of the Army Air Corps has done much for commercial aviation. If Army pilots could be induced to confine their bibulous proclivities to their quarters, . . . it would do much to confirm public confidence in aviation, military and civil."

I have at hand a letter from Major General James E. Fechet, Chief of the Air Corps, informing me that after that editorial was called to his attention he ordered an investigation and that this revealed no "information on which such an editorial could be based."

General Fechet also enclosed a letter which reached him unexpectedly and was wholly unsolicited. It was written by R. E. Mittelstaedt, Adjutant General of the State of California. The following paragraph is worth quotation:

"I attended that dinner and saw no misconduct on the part of the few Army officers present, not more than five among more than 1,200 civilian employees of the air industry. But the audience did have considerable fun with Mr. Pritchard, editor of this magazine, who presided at the dinner. He persisted in delivering a speech which these people apparently did not want to hear and there was considerable . . . noise during his endeavor. I particularly observed that the Army officers did not take part in this demonstration."

The writer of these few chastening words, in any average year, will attend more dinners connected with aeronautics than the editor of *Western Flying* will be invited to attend in all his life (which we hope may be long and prosperous and bring him added wisdom as its years glide pleasantly by), and at many such dinners officers of the Army Air Corps have been present. It ever gives me satistaction to speak pleasant truth, and the facts in this case are that I have never at any of the multitude of feasts seen one member of the Army Air Corps act other than a gentleman should.

Of course one would hate to think that Mr. Pritchard, himself, on such a glad occasion, might be unable to appraise accurately the condition of companion guests, perhaps because his too much state patriotism led him to too elaborate consumption of native California vintages. No . . . No . . . No! A thousand NOs in capitals. But perhaps grief did it. Sorrow, as well as joy, is an intoxicant. And what grief could be acuter than that of a spellbinder whose spells fail to bind, who stands upon his feet and emits words which to him seem glorious, pure eloquence, but which are received by those who listen as — what shall we say, Spaghetti? Hooey? Bunk? It doesn't matter. You know what we mean. The thought of Pritchard in such circumstances becomes pathetic.

AT LAST the air mail contracts have been awarded, and the streets of Washington now rival in their loneliness those of the Deserted Village celebrated in famous verse by a great poet. The contractors have gone home to fast and pray in an endeavor to find out just what has been administered to them by Postmaster General Brown.

A few days after the award of the last transcontinental agreement, a new corporation was formed by Western Air Express, TAT-Maddux and Pittsburgh Aviation Industries in which Western Air Express has 47½ per cent interest, TAT 47½ per cent and Pittsburgh Aviation Industries five per cent. Harris Hanshue, of Western Air Express, is president; and Clement M. Keys, of TAT, is chairman of the board. The contract which has been awarded makes mandatory stops at Philadelphia, Pittsburgh, Columbus, Indianapolis, St. Louis, Kansas City, Wichita, Amarillo and Albuquerque, with an alternative cut off route from St. Louis through Tulsa to Amarillo.

Politics makes strange bedfellows and apparently Postmaster General Brown, who by some is conceded to be a good politician, has made some very queer ones among the air mail contractors. Only time, of course, can reveal eventual results. But if firm foundation exists for the ugly current rumors about the methods employed in forcing these contracts down the throats of the three organizations involved, it seems not impossible that even after all the long delay before the granting of awards the next Congress will find it desirable to scrutinize them very closely.

The awards were made under the Watres Act, which, as originally written, endowed the Postmaster General with broad discretionary powers. Amendments adopted before the bill finally became a law provided that contracts could be awarded only to companies which had had actual and recent experience in operating airlines at least 400 miles in length.

The apparent intention of this plan was to enable the Postmaster General to separate (*Continued on page* 162)

COMBINING PRIMARY and SECONDARY TRAINING GLIDERS

By A. P. (Duke) Artran
Vice President, Franklin Glider Corporation

SOON after we began activities at the Franklin School of Gliding at Ypsilanti, Michigan, we discovered several disadvantages with the conventional methods and the Zoegling (German open fuselage type) primary trainer glider. The principal drawback of this type ship is that it is sluggish on the controls. It was designed more as an air sled to slide down from a hill on the air rather than for flying. Consequently, it lacks maneuverability, which breaks the student's confidence. Occasionally this sluggishness may be dangerous because it renders it difficult to avoid obstacles or to bring the ship back to level flight after the student has made a mistake.

The Franklin glider in flight

Moreover, the Zoegling also has shown a tendency to side-slip into a spin when stalled as a result of the novice's inability to judge flying speed. Both its flying and landing speeds are too high for satisfactory student instruction. Any tendency on the part of the beginner to keep the nose of the ship up and over-stretch his glide is further accentuated by the Zoegling's low gliding angle, which averages around five to one. We found also that Americans value time too highly to spend forty or fifty minutes assembling such ships, and they are too impatient for the frequent re-rigging of them in the field made necessary by the external wires becoming stretched or broken by hard landings.

With the conventional shock-cord launching, the maximum velocity is attained within the first two or three seconds, and such sudden acceleration is unnerving to the beginner.

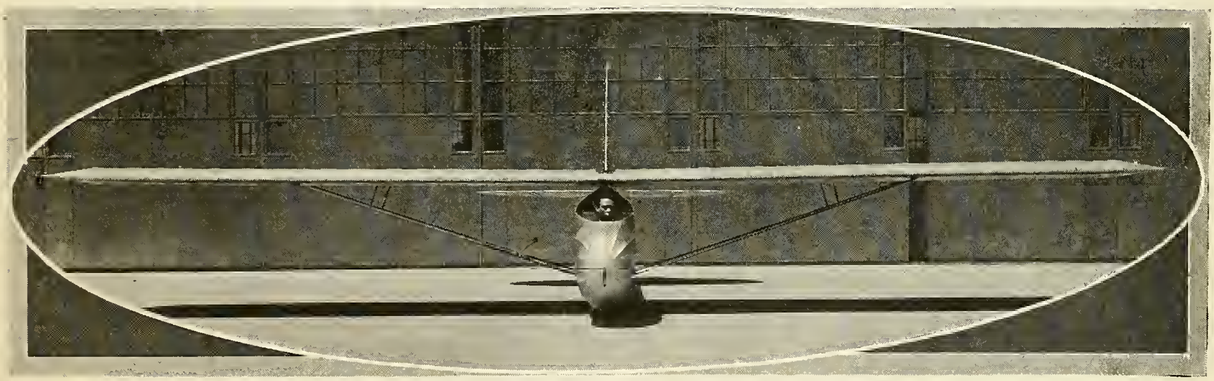
Some German glider enthusiasts advocate launching the novice into the air from a hill for his first flight. Although the German students with their older and larger organizations receive a more thorough ground school training than the average American, their initial flights are, we believe, made without sufficient practical experience with glider controls. The Franklin school strongly disapproves putting any student into the air until he has had time to familiarize himself with the feel of the ship and until he has learned to coördinate properly his three controls.

If the beginner in the shock-cord method is not shot into the air, the alternative is a grass slide down a gentle slope. This means that he must hold his stick well forward to carry the tail of the ship high to prevent an unintentional take-off. With the Zoegling type glider this tends to dig the nose of the skid into the ground, causing excessive friction and a bumpy slide. About nine such slides out of ten result in getting one wing down; the student is too confused with the sudden speed and the jolts to pay much attention to lateral stability, and one wing tip digs into the ground, causing the ship to ground loop.

The whole slide lasts only five or six seconds and usually ends in complete loss of control. Not only is this confusing and discouraging; it is all over too quickly for the student to realize what he has been doing. The ship must then be laboriously dragged up the slope again by men already tired from running with the shock-cord.

This method has produced good pilots, but it is painfully slow and discouraging. Only a very small fraction of the time on the field is actually spent in gliding. Most of the men and women (from sixteen to sixty) who take up this wonderful sport in this country must necessarily indulge in it in their leisure hours. If they adopt the German method, it will be several months for many of them before they have the true feel of the air.

The glider design which was developed in the laboratories of the University of Michigan is, we believe, a far more efficient type of aircraft. It permits a new technique in student instruction. It is designed as a rigid unit to withstand stresses in all directions without the use of wires that can loosen and get out of rig. Bracing is accomplished by four streamline steel tube struts. Consequently, the ship can be assembled and ready to fly in about one-fourth the time required for the German types. It is so designed as to be always in rig, and great care has been taken to make the hooking up of the controls fool-proof. Unfortunate accidents have occurred as a (*Continued on page* 148)



Front view of the Franklin glider showing the cleanness of its general design

AERIAL OBSERVERS IN THE FOREST SERVICE

By Fred L. Hattoom

ONE of the greatest allies of the National Forest Service is the airplane, as a means of observation and in directing men in the control of forest fires. Many thousands of acres of wooded area have been saved from flames during the last year through the use of aerial observers who obtained information regarding fires which otherwise could not have been gotten in time to enable the forest service to bring its equipment and forces into effect.

Last year was considered one of the best years the forest service has had, for there were fewer fires and more successful control. During 1929, there were only 683 fires in Region Five, which includes eighteen national forests in California, extending slightly into Nevada and Oregon. These fires caused a loss of 169,625 acres of national timber. This seems to be a considerable timber loss from fire for one year; yet, it is one of the lightest losses in this region for some years.

Of the thirty-six fires in the Angeles National Forest area alone last year, only 169 acres of timber were destroyed. The main endeavor of the forest service, other than to prevent the start of fires, is to control as quickly as possible those already started.

Airplanes were first introduced in the forest service in 1920 by the division controlling the Angeles National Forest. Planes at Rockwell and March Fields were supplied by the Army to make three patrols daily over the Angeles National Forest area as fire detectors. After one year, analysis disclosed that planes were practically useless as a detection agency because of their tremendous speed, but were most important and unsurpassed for their observation value, as a means of rapidly investigating reported fires.

In daily patrol a plane passing over a certain portion of forest area would be a hundred miles away from that point in an hour; and if fire should break out there shortly after the plane had passed over, the observer would not detect this fire until his return trip several hours later, by which time a mere blaze would have spread and devastated hundreds of acres of timber.

As a means of observation, the planes are now used in conjunction with the lookout station service. Smoke spotted by one of the many lookouts, who are located at regular intervals throughout the entire national forest area, is reported to headquarters, which in turn relays the report to other lookout stations in the fire vicinity. The report of three of these stations is protracted, and thereby the exact location of the fire is learned.

For a forest service ranger to ride horseback to the scene in some cases would require almost a full day, by which time the value of an early report is lost. Therefore, as soon as the fire location is learned, a plane, unaffected by the terrain or the lack of trails and carrying a forest service man, flies to the spot in time to get full details of the fire's progress before it has had a chance to spread.

In the case of large fires, a plane is most valuable in its ability to circumnavigate the entire fire area at a fast speed and keep the ground crew constantly informed as to the fire's progress and how it can best be retarded. Changes in atmospheric conditions and wind direction may reverse the fire's action. A forest supervisor above efficiently directs his men on the ground. The use of planes in this capacity is just one of the many modern fire control methods that were not available years ago, and because of its lack in those days, a fire would often burn for weeks before it could be properly observed and controlled.

Under an appropriation from Congress for the forestry service, a government contract for 1930 was let to the Aero Corporation of California, whereby airplane observation extends over Southern California forest land from the San Luis Obispo County line on the north to the Mexican border, and from the Mojave Desert on the east to the Pacific Ocean.

Paul Richter, Jr., vice-president of Aero Corporation of California, and W. V. Mendenhall, forest supervisor

Subject to call, three planes of the Aero Corporation, capable of speeds in excess of 100 miles per hour, are stationed at points where they are capable of flying to any part of the Southern California forests in an hour's time.

The first call of the season under this contract resulted in the immediate control of thirty-four small fires started within twenty-four hours by lightning in the San Bernardino National Forest. One of the Aero Corporation of California planes, piloted by Ivan R. (Ole) Olson, picked up Forest Supervisor J. E. Elliott of that district, and they stripped the entire San Bernardino National Forest in observing the fires and patrolling for others.

At the beginning of the season orders were issued to all pilots of Western Air Express to keep a sharp lookout for forest fires while on their

(*Continued on page 156*)

EDITORIALS

THE R-101

WE must all recognize and regret the unfortunate tragedy of the R.101. AERO DIGEST, like the whole world, grieves over this disaster. But it will be well to recall that travel through the air is not the only human activity which occasionally takes toll of life through some unavoidable crisis inflicted by natural processes impossible to foresee.

Tragic as the destruction of the R.101 was, air travel will not be permanently retarded because of it. The loss of ships and thousands of lives did not thwart the progress of surface sea travel. The vast toll of life and limb taken by railways did not forestall transportation by train. The greatest mechanical slaughter, the annual toll of the automobile, has not even slightly decreased the sale of motor cars.

No, the fate of the R.101 should not be cause for despair for the future of dirigible travel. Rather, it ought to emphasize that, even though we have progressed far with rigid airships, we still have much to learn before they can be operated with consistent reliability.

The wreckage of the R.101 revealed no evidence of structural failure. Weather conditions alone appear to have caused the disaster. We are still in the experimental stage so far as meteorological knowledge is concerned. Although in the last generation we have developed a commendable science in the building of aircraft, we have had the weather problem to deal with since the world began.

MAKING AIR TRAVEL CONVENIENT

SPEED, of course, must be the greatest factor in popularizing air travel. But because air travel can be speedy is no good reason for forgetting that it must compete with other methods of transport in safety, comfort and, especially, convenience of schedule. Speed, safety, dependability—these are of fundamental importance. But convenience of schedule must be classed as a fourth essential.

Except possibly when very long distances must be covered, fast air transport loses its chief advantage if passengers must wait for a scheduled plane so long as to offset the saving afforded by that plane's speed superiority over other methods of travel. A half day lost in waiting for a fast plane is as irrevocably non-productive as a half day wasted traveling on a slow train.

The time soon must come when scheduled planes will take off on important routes with the frequency of every hour, half hour or even fifteen minutes. If hurried people know that by going to the nearest airport they can find transport ready for them without long waits, they will be far more disposed than now to travel by air.

Several lines already have been compelled on many occasions to operate sections of two, three, or even four planes over routes where only one daily ship flew last year. This fact alone predicates the opportunity to operate planes at more frequent intervals. And when more numerous planes regularly fly on more frequent schedules, many more passengers will find it advantageous to use the airlines. Colonial Air Transport, flying four round trips daily between Boston and New York, and the Ludington company, operating ten round trips every day between New York, Philadelphia and Washington, probably are the only lines in the East that actually carry any considerable traffic. That they are constantly becoming more successful is doubtless largely the result of the addition of the factor of convenience to speed, dependability and safety.

TRIBUTE TO AIR MAIL PILOTS

TRANS-ATLANTIC and other long-distance fliers have been lionized by the public, as they undoubtedly have deserved, for their work has been daring and constructive. But we must not forget those others who do great things regularly and never get acclaim.

No Broadways are filled with gaping thousands while ticker-tape and leaves of ruined telephone books flutter in wood pulp applause from the higher windows of the skyscrapers in honor of the Air Mail pilots, but the records of their service are replete with episodes deserving tribute.

21 DAYS REDUCED TO 21 HOURS

AIRPLANES are constantly becoming more dependable and safer to operate. To allay any skepticism in this regard, one needs only review the numerous recent cross-country flights made by woman pilots and boys of between sixteen and eighteen years of age. Not only are these fliers making safe and successful flights across the continent; they are doing so at ever increasing speeds.

We cannot fail to honor and admire Miss Laura Ingalls and Mrs. Keith Miller. Mrs. Miller crossed the country from New York to California in twenty-five hours and then returned in twenty-one and three-quarters hours. Miss Ingalls' time for the westward flight was approximately five hours more and for the eastward trip about four hours more than Mrs. Miller's time. But the real significance of these flights is not to be found in competitive speed; it resides in the fact that they were accomplished with comparative ease by woman fliers. Two boys, Eddie Schneider and Robert Buck, whose ages range from sixteen to eighteen years, have distinguished themselves similarly this year, and their flights carry the same basic meaning.

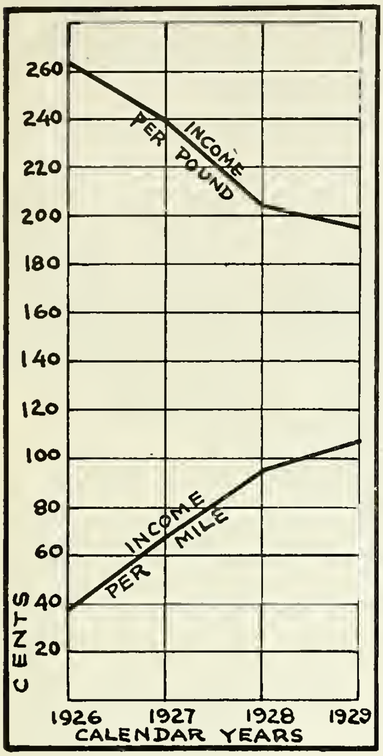
Nineteen years ago "Cal" Rodgers, one of the most experienced airmen of his day, blazed the first air trail across the continent. He made the trip in twenty-one days. And now a woman flies it in twenty-one and three-quarters hours. Truly, with modern ships, we are learning to fly.

JAPAN IN THE AIR

THE new plan of the Japanese General Staff and Air Board calls for the expenditure of $100,000,000. The Japanese Naval Air Force is to be doubled from sixteen to thirty-two squadrons. More airships are to be built. One hundred more planes for aircraft carriers are included in the expansion program. The aircraft industry is to be materially encouraged and more men are to be trained for it.

This program of the Japanese is not something which is being merely talked about, but something which is actually under way. Japan wants a stronger air force. Therefore, she concentrates on the job of building one. Such news should stimulate this nation to keep pace with the aerial development of the other world powers.

The AIR MAIL CROSSES the DOLLAR LINE



Air mail income per mile and income per pound, all lines. 1926-1929

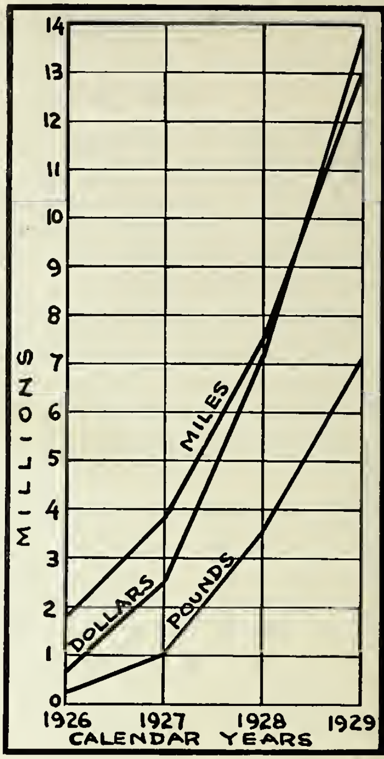
By Ernest Jones

SEVEN air mail operators showed one dollar or more for every mile flown in 1929, according to official figures. The gross income to the air mail carriers as a whole nearly doubled that of the year before and was six times that for 1927. The poundage doubled as well, and it will be recalled it had doubled once before when the price of postage to the consumer was halved in 1928.

The average income per mile moved up in 1929 to $1.06 from ninety-four cents for 1928, the first full year of contract mail; and the income per pound has dropped from $2.03 to $1.95.

Although these seven operators crossed the dollar line, thirteen other routes fared less heartily. Three collected from sixty-nine to ninety-five cents a mile, and ten received anywhere from approximately thirteen cents (12.7) to forty-nine cents.

The Transcontinental continues to carry about half the total air mail in its two sections, and the tributary country west of the Alleghenies handles as much again.



Miles and pounds flown, and dollars received, all lines, 1926-1928

MILES FLOWN, POUNDS CARRIED AND DOLLARS EARNED, ALL DOMESTIC CONTRACT ROUTES, 1926-1929

Route	Calendar Years	Miles Flown	Pounds Flown	Mail Income	Mail Income per Mile	Mail Income per Pound
1	New York—Boston					
	1926	50,708	6,630	$ 19,813	$ .398	$3.00
	1927	111,132	20,186	60,561	.545	3.00
	1928	121,127	55,742	166,867	1.375	3.00
	1929	237,143	116,095	348,239	1.47	3.00
2	St. Louis—Chicago (including St. Louis—Omaha)					
	1926	89,127	22,718	50,459	.508	2.22
	1927	123,117	34,784	88,255	.716	2.53
	1928	243,885	63,489	160,702	.68	2.53
	1929	680,581	143,356	248,808	.381	1.74
3	Dallas—Chicago					
	1928	445,375	63,191	174,172	.391	2.75
	1927	—	108,789	329,389	—	3.00
	1828	—	226,036	678,083	—	3.00
	1829	1,232,781	380,857	1,174,142	.953	2.95
4	Los Angeles—Salt Lake					
	1928	302,389	76,564	199,778	.866	2.60
	1827	488,329	203,224	609,871	1.30	3.00
	1928	—	385,884	1,158,654	—	3.00
	1928	760,405	757,685	2,272,977	3.00	3.00
5	Salt Lake—Pasco (inc. Spokane)					
	1928	161,356	33,241	85,000	.588	2.86
	1827	322,570	59,972	178,819	.558	3.00
	1928	378,853	133,348	400,032	1.055	3.00
	1929	585,201	288,992	711,159	1.215	2.48
8	Los Angeles—Seattle					
	1826	168,509	19,645	55,560	.333	2.82
	1927	693,350	76,386	218,048	.312	2.82
	1028	702,739	137,664	369,740	.55	2.83
	1029	812,596	253,437	721,456	.887	2.85
9	Chicago—Twin Cities (inc. Green Bay)					
	1926	145,462	7,235	17,453	.119	2.42
	1927	192,425	27,647	78,030	.395	2.75
	1928	299,520	71,100	195,524	.652	2.75
	1929	701,585	179,376	493,109	.69	2.75
11	Pittsburgh—Cleveland					
	1926	—	—	—	—	—
	1927	84,316	19,573	58,719	.81	3.00
	1928	82,081	66,817	200,452	2.44	3.00
	1829	188,077	97,027	290,851	1.75	3.00
12	Pueblo—Cheyenne					
	1926	74,918	17,135	47,280	.63	2.76
	1927	98,400	38,183	103,063	1.05	2.85
	1928	—	62,818	52,139	—	.83
	1929	168,685	98,828	82,027	.49	.83
16	Louisville—Cleveland					
	1928	—	—	—	—	—
	1927	—	—	—	—	—
	1828	108,535	28,285	34,508	.318	1.22
	1929	358,993	05,840	118,872	.327	1.22
17	Chicago—New York					
	1928	—	—	—	—	—
	1927	—	172,851	205,882	—	1.18
	1028	—	909,040	810,814	—	1.01
	1929	1,348,405	1,618,288	1,350,444	1.00	8.35
18	San Francisco—Chicago					
	1920	—	—	—	—	—
	1927	786,599	280,506	608,280	.774	2.10
	1928	1,817,809	986,162	2,018,655	1.111	2.035
	1929	2,761,174	1,797,506	3,681,515	1.33	2.04
19-25	Miami—New York					
	1928	210,761	14,338	38,188	.183	2.67
	1927	—	—	—	—	—
	1928	431,808	111,464	328,875	.757	2.95
	1929	1,164,822	462,926	1,201,902	1.035	2.80
20	Cleveland—Albany					
	1926	—	—	—	—	—
	1927	3,324	329	365	.11	1.11
	1928	204,847	52,988	56,615	.288	1.11
	1929	385,908	102,083	113,286	.293	1.11
21-22	Galveston—Dallas; Brownsville—Dallas					
	1926	—	—	—	—	—
	1927	—	—	—	—	—
	1928	445,519	72,058	208,204	.463	2.80
	1929	847,878	129,065	372,950	.44	2.90
23-29	Houston-New Orleans-Atlanta					
	1926	—	—	—	—	—
	1927	—	—	—	—	—
	1928	207,699	27,877	48,433	.234	1.75
	1929	548,324	128,756	193,663	.353	1.50
24	Cincinnati—Chicago					
	1826	—	—	—	—	—
	1927	6,480	1,043	1,534	.237	1.47
	1928	183,438	41,098	80,401	.33	1.47
	1929	394,042	79,364	116,600	.296	1.47
26	Salt Lake—Great Falls					
	1926	—	—	—	—	—
	1927	—	—	—	—	—
	1928	165,324	23,871	58,082	.357	2.48
	1929	436,482	69,373	171,860	.393	2.47
27	Chicago—Bay City					
	1926	—	—	—	—	—
	1927	—	—	—	—	—
	1328	—	—	—	—	—
	1929	462,409	173,232	154,103	.334	.89
20	Atlanta—Chicago					
	1826	—	—	—	—	—
	1927	—	—	—	—	—
	1928	46,993	6,850	0,900	.147	.76
	1929	599,442	98,067	76,491	.127	.78

(Data from Department of Commerce)

TOTALIZATION BY YEARS

In the following table the annual totals of all domestic contract routes are listed, including miscellaneous short-time discontinued routes omitted in the foregoing.

Calendar Year	Miles Flown	Mail Income	Pounds Flown	Income per Pound	Income per Mile
1926	1,841,225	$710,042	289,671	$2.83	$.385
1927	3,821,224	2,561,268	1,085,498	2.40	.67
1928	7,669,055	7,208,842	3,545,630	2.03	.84
1929	13,081,609	13,873,814	7,089,581	1.95	1.06

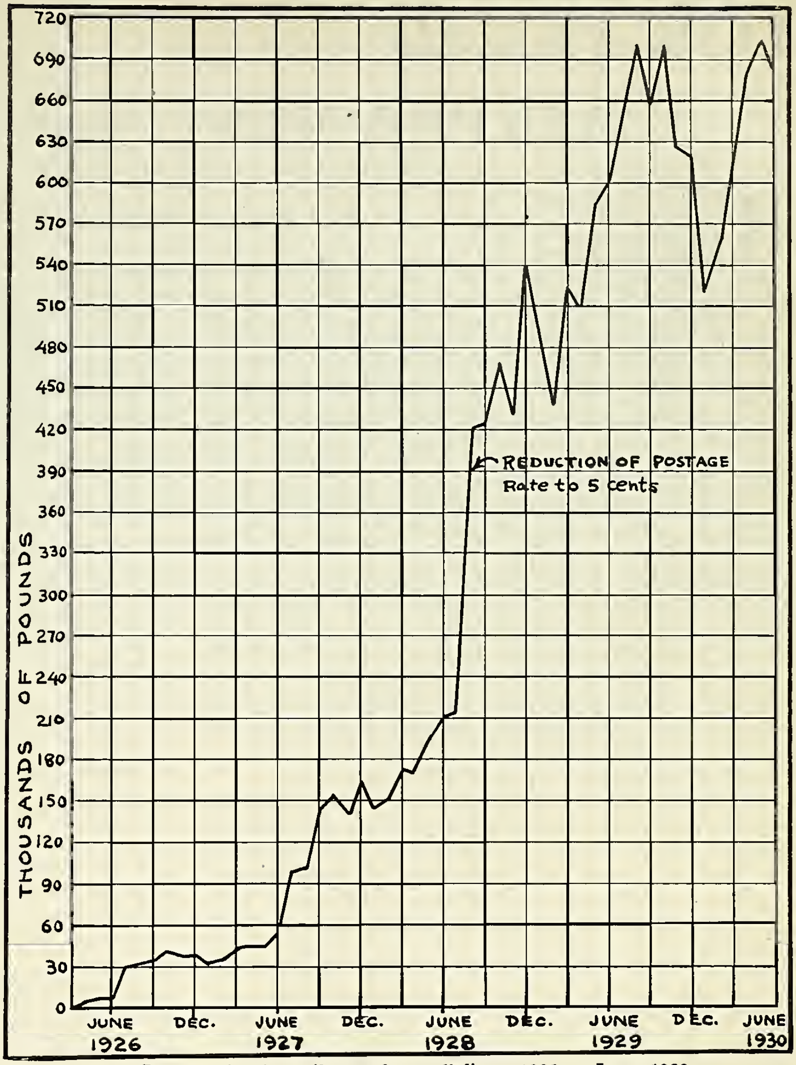
Feeding in and from the San Francisco-Chicago route are the Los Angeles, Pasco, Pueblo and Great Falls lines whose total in 1929 was 1,224,878 of the 1,618,288 pounds carried by the western half of the Transcontinental. It might be argued the difference was made up of San Francisco, New York and way-station letters.

The group feeding in directly to Chicago—St. Louis; Brownsville, Galveston and Dallas; St. Paul-Minneapolis; Pittsburgh, Louisville, Cincinnati; Bay City section; and Atlanta—made up 1,376,284 of the 3,415,794 Transcontinental poundage.

These two groups, then, made up 2,601,162 of the 3,415,794 pounds carried by the Transcontinental as a whole. What part of this feeder mail stayed in Chicago, or was weighed again and carried east or west, is something upon which to speculate.

The feeders to the Eastern area—Boston, Houston, Miami and Atlanta routes—furnished but 809,860 pounds. The Los Angeles-Seattle route would appear to be operating rather successfully in its own area, and there remains but the ferry line at the Chicago airport.

With the listings arranged in groups, one may but guess at the poundage actually mailed at the source. If it should happen that the Transcontinental, Eastern group and the Los Angeles-Seattle line poundage represented approximately the letters originally mailed and counted but once, Uncle Sam would have about $9,000,000 toward balancing last year's subsidy of $13,873,614, without which, of course, there would be no contract air transport.

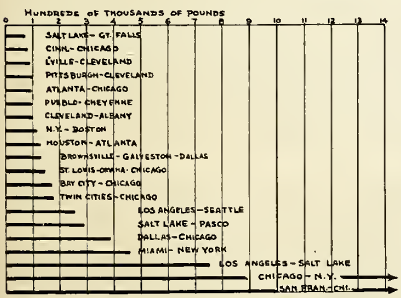


Increase in air mail poundage, all lines, 1926 to June, 1930

1929 Poundage of the Air Mail System by Groups

Western Group

Los Angeles-Salt Lake City	757,685
Salt Lake City-Pasco	288,992
Pueblo-Cheyenne	98,828
Salt Lake City-Great Falls	69,373
Total	1,224,878



Graph illustrating the amount of 1929 air mail poundage by routes

Middle West Group

St. Louis-Chicago	143,356
Galveston-Brownsville-Dallas	129,065
Dallas-Kansas City-Chicago	390,957
Twin Cities-Chicago	179,376
Pittsburgh-Cleveland	97,027
Louisville-Cleveland	95,840
Cincinnati-Chicago	79,364
Bay City-Chicago	173,232
Atlanta-Chicago	98,067
Total	1,376,284

Transcontinental

San Francisco-Chicago	1,797,506
Chicago-New York	1,618,288
Total	3,415,794

Eastern Group

Boston-New York	116,095
Houston-Atlanta	128,756
Miami-Atlanta-New York	462,926
Cleveland-Albany	102,083
Total	809,860

West Coast

Los Angeles-Seattle	253,437
Chicago Ramp	19,328
Grand total	7,099,581

Foreign Mail Operations

The foreign mail operators—to Montreal, Nassau, Cuba and South America—carried 672,433 pounds additional, for which they received $3,168,906, the tidy sum of $4.71 a pound.

Passenger Business

Thirteen of the twenty routes did a considerable passenger business along with mail. The mail lines carried 27,531 passengers during the calendar year 1929, more than half the number carried by all operators the year before. The express carried on the mail routes totaled 176,795 pounds. Of

(*Continued on page* 138)

LOW-PRICED AIRPLANES

Factors Which Can Increase the Sales of Popular Type Aircraft

By Blaine Stubblefield

RECENT substantial increases in passenger traffic on airlines, following reduction in rates, would seem to indicate that a goodly portion of the public really wants to get into the air. Wide-spread general interest in aviation, coupled with this increase in air travel, would seem to mean also that the public would like to fly its own planes. Large student enlistment at air schools, and heavy patronage of joy-hopping concerns on bargain days, confirms the supposition that there are large numbers of persons who enjoy flying and are not afraid.

Indeed, the number of such persons is undoubtedly large enough to form a good-sized market for small pleasure and business craft. And it is reasonable to suppose that thousands might, under suitable circumstances, turn to the air for recreation, if they could do so within their means. The "means" of this large group, which is, by the law of averages, made up largely of workers for modest salaries, is composed of two important quantities: money and time. These people have only a limited amount of both to spare. Their working schedule provides one and a half or two days leisure each week, and their recreation budgets provide only a few hundred dollars a year.

Considering first the always important money question, it is certain that the employee group cannot buy airplanes worth $3,500 to $10,000. Manufacturers of those classes of ships must depend for continuance of their splendid progress on a relatively small group of sports people with much spare money and much spare time, and on airline operators, government services, etc. A good job of selling among those classes will bring a healthy yearly growth in the sales of present standard equipment. But such equipment is beyond the reach of the masses whose dollars have made the automobile industry. There is no use in offering the present-day, conventional airplane to them at prevailing prices.

What, then, can the average earner buy in the way of aircraft? If he keeps an automobile for recreation only, he might discontinue its use in favor of a plane. Or, if he needs a car, he might use a cheaper one. In either case, he can muster from $900 to $2,000 as first cost of recreation and business travel equipment that he can use for two to five years. In other words, if he sees in the sales room a suitable plane tagged at from $900 to $2,000, the price is one thing about it that does not scare him. He feels equal to it; he *could* buy it. Such a *price* would interest thousands in his class.

Once the price is within the prospect's reach, what details regarding the plane's appearance and performance would interest him? Briefly regarding appearance, the ship should look and be substantial. It should have a roomy cabin for two, three, four people, as much like an automobile interior as consistency with air travel allows, and it need not be more elaborate than a cheap car. Nothing much out of the ordinary so far.

What sort of engine should it have? One as reliable and fool-proof as human ingenuity can devise—and such engines will soon be on the market. Their principle of operation will, however, be less complicated than that of even the most conventional automobile engine. Such engines are now in process of successful development. Using such an engine, how should this airplane perform?

Again the purchaser is made to feel at home—in contact with familiar conditions. This plane, the salesman tells him, travels seventy miles an hour. "My car will do it," thinks the prospect. Its engine, again arbitrarily, develops sixty horsepower. The same as his automobile engine, or the engine of his friend's car. It lands at twenty-five miles an hour. "You can stop in a car length at that speed," he reflects. "Fine! There's nothing so swift about this flying business after all." But then he gets another idea. "If the flying machine has no more power and no more speed than the automobile, why bother with it?" The question brings up a point that has been all but neglected in presenting aviation to the public.

The aviation industry has talked about speed—always about speed. Perhaps speed has been talked too much. Most people are afraid of it. Speed is all right for aviators and Cannonball Bakers, they reason, but not for the average individual at the controls. What seems to me fully as potent as speed as an appeal to the imagination and to lay reason, is the idea of taking a straight course from one point to the other. As the crow flies. Airplane travel ignores the irregularities of both lateral and vertical surface dimensions—of both curves and hills. A seventy-mile airplane, for instance, can go from New York to Boston in less than three hours, with ease. A seventy-mile automobile can make the same trip in approximately six hours, ease depending on the nervous stamina of the driver. The powered aircraft is the first vehicle that can go in a near-straight line wherever its master wills.

So, it is not so much speed as freedom and right-of-way that are sold with airplanes and air travel. The lure of isolated valleys, mountain meadows, quiet lakes, not far distant in miles but totally or nearly beyond the week-end range of the average car owner, certainly would interest him in an airplane.

Assuming that the plane, its performance and its price are right with the prospect, the next question he will ask is: "How long will it take me to learn to fly it?"

Time is the second important consideration with him. And this involves some more money. If, in accordance with present usual practice, the salesman were offering a standard small plane, he would tell his prospect that a thirty-hour course required for a private license would be necessary. The thirty-hour course would take him, aside from his regular job, from three to six months to complete. The cost of the course would be $300 to $600. That, with the time involved, kills the deal so far as this employee is concerned. He hasn't the money or the time to spare.

But, on the other hand, going back to the low-priced simple airplane in question, the salesman could tell him a different story. "We teach you to fly it before delivery, in a few lessons," he would say, "and the instruction costs you nothing. If, after a few preliminary flights, you are found to be unable to fly (*Continued on page* 170)

ORIENTAL AERONAUTICS

What Japan Is Doing To Establish Her Place in World Aeronautics

By Walter Buchler

JAPAN, probably the most progressive nation in the Far East, is at least the most anxious to keep abreast of modern developments. This disposition is particularly evident in her interest in aviation, the military importance of which the Japanese government has been quick to realize. So much so that in 1911 a number of Japanese officers were sent to Europe for training. During the war more were sent to the Western fronts to study the latest practices in military aviation.

The government has since pursued a steadily progressive policy, increasing its equipment with modern types of aircraft and adding to the number of its military and naval pilots.

Foreign experts have been employed to give instruction at the principal flying centers, of which there are seven military and four naval, in different parts of Japan. Undoubtedly, the satisfactory standard at present attained is chiefly the result of this instruction by foreign experts retained by the Japanese government.

Japan's naval airmen are reputed to be more efficient and better pilots than their military confreres, apparently because of the superior method by which they are trained. Yet, although no one is more courageous than the Japanese airman, he usually lacks that mechanical instinct and power of prompt decision so necessary to the reliable flier. The average Japanese is also inclined to be somewhat careless about his machine, more as a result of his lack of technical knowledge than of his absence of foresight. It is not, therefore, surprising that accidents occur frequently in Japanese aviation.

The Japanese authorities themselves admit that in aviation their country is far behind Western nations, particularly in regard to the standard of home-produced equipment. There are at present ten important aircraft and accessory factories in Japan, chiefly engaged in turning out supplies to government orders. Considerable quantities of material, as well as complete aircraft, are still purchased from abroad, however, and are undoubtedly superior to those of Japanese manufacture.

Japanese-built Kawanishi K-12 monoplane in flight over native territory

This demand for imported aircraft and material is likely to grow, for the government two years ago announced its intention of spending $11,000,000 in the course of the following seven years in affording liberal financial assistance to commercial aviation in Japan.

There are at present five air mail services in operation between Tokyo and Osaka, and Osaka and Fukuoka, Tokyo and Niigata, Imaharu and Bettsupu, operated by seaplanes and making three flights a week. A passenger service between Tokyo and Dairen was also recently begun.

But apparently the Japanese public is not yet air-minded, for although the ordinary postal service in Japan is by no means good, the average number of letters conveyed by mail is exceedingly small in comparison with that carried in this and other countries. This in spite of the fact that no extra charge is made for carriage of mail by air; all that is necessary is to mark the envelop *Hiko-Bin* or "air mail."

A total number of about 106 machines, mostly supplied by the Japanese government, are used in civil aviation, and there are about 243 qualified pilots available (including seven women). Their ranks are being increased steadily, however, with students from the Flying Training School. Competition for admittance to this school is keen, only about ten per cent of the total number of yearly applicants being admitted. At present, there are more than twenty-eight private aviation training institutes in different parts of Japan, each with its own training ground or aerodrome.

The flight to London, in July 1925, of the two Japanese military aviators, Abe and Kawachi, created wide enthusiasm in Japan and, at the same time, greatly helped to popularize aviation. Trans-Atlantic and trans-Pacific flights are watched with particular interest in Japan, and at the present time there is considerable agitation seeking to have such a flight attempted by a Japanese airman from Yokohama to Seattle. It is doubtful, however, whether there is a Japanese airman sufficiently experienced or a Japanese machine capable of undertaking so strenuous a flight, and it is more probable that future energies will be devoted to furthering the development of commercial flying and the improvement of the military and naval air forces.

In this connection, a valuable and hitherto inadequately exploited market awaits the American aircraft trade. Aircraft, powerplants and accessories are in constant demand, and firms here would be well advised to appoint some well-established engineering firm in Japan as their agents or maintain their own representative.

Opportunities, too, occasionally arise for enterprising and capable foreign pilots in Japan. The government is anxious to improve the average standard of flying and to develop the country's aircraft trade so as to enable machines to be produced which are as good as those imported from abroad.

Thus, although aviation in Japan has made rapid progress, it still has far to go and its development might advantageously be fostered by American interests and brains.

WHAT ABOUT THAT 55 PER CENT?

Lieut. F. B. Kauffman, U. S. N.

A STATEMENT recently released by one of the large insurance companies tells us that fatalities from flying are so on the increase that in the tables of "Causes of Mortality" aviation must now be included. Millions of dollars have been invested in aviation. This investment can bring returns only in the degree that air travel is made popular by a reduction in casualties. The airline on which serious crashes occur suffers not only reduced patronage resulting from fear, but also financial instability resulting from fluctuations of its stock when such accidents take place.

Those Government bureaus concerned with aviation have adopted a standard form for classifying airplane accidents. This form, when properly filled out, makes possible a complete study of all crack-ups. On the basis of such analyses, the Department of Commerce has attributed fifty-five per cent of all crashes to errors of the pilot. This would seem to be a big burden for the pilots to bear. As a matter of fact, we don't like to acknowledge these figures, but nevertheless they stand out in big numerals. And as long as they do exist, we must ask ourselves, "What are we going to do about them?"

But who is "We?" Is "We" the Department of Commerce, the Army, the Navy, the airplane manufacturers, the operators, or the National Air Pilots' Association? So far as I can learn, the only bodies that *are* taking this situation in earnest are the large insurance companies and aviation underwriters.

The Federal Government has drawn up airworthiness requirements for aircraft—all aircraft—to make the machines as safe as possible to fly. Engines must undergo stringent tests before they can be flown. Both planes and engines must have Approved Type Certificates before they can be sold to the public. Ground and flight schools for training pilots are certified and approved by Federal inspectors. On completion of courses, students must pass suitable examinations for licenses before they may fly commercially. After that, except for perfunctory renewal of licenses and medical examinations, interest in the pilot is lost unless he breaks flying rules or crashes his plane.

The ability of a pilot who has had enough time to get his transport license is comparable to that of a high school boy who has received his diploma. He is just at the beginning. None of the large transport companies will employ a pilot with less than 800 to 1,000 hours. Operators want pilots with flying experience, and after 1,000 hours the average pilot is considered to have gained sufficient flying experience to be trusted with the lives of passengers.

An old pilot who has been flying and instructing for some fifteen years said that he didn't learn anything after his first 400 hours. He probably did not mean that literally; more likely he meant that his early flying was most important. Naturally there are different ways of accumulating this important and costly amount of time required by operators. I know one young pilot who accumulated almost 200 hours by flying around one field in the same type of ship. Compare such flying to that of the young pilot who has made cross-countries, who perhaps has flown as second pilot in ferrying transports or has been trusted in ferrying other ships for operators. It is comparatively easy to count flying hours; it is considerably more difficult to ascertain the quality of time in the air. The operator employing a new pilot can, however, derive some idea of the flying the candidate has done by a glance at his log book, which can be interpreted as a record of his ability.

Apropos of the old saying about "birds of a feather," have you ever noticed in a gathering how pilots flock together? The reason usually given to explain this tendency is that fliers speak the same language. Probably a more fundamental reason is that, inasmuch as it is impossible for any one man to experience all the incidents in flying, pilots try to benefit by the experiences of others. Watch a group of pilots at any field gather about one of their number who has had an unusual experience. They will ask, "How did she act?" "How did she feel?" "How much wind?" "What did the motor sound like?" This is the kind of experience operators want their pilots to benefit by—the kind of information that makes for better pilots.

Yet, if a prospective employer should find in a pilot's log that he had been forced down by bad weather and crashed, that he had jumped from his burning plane, that he had had several forced landings due to rain and snow and had crashed, that he had once been forced to land a plane in the water, the pilot more than likely would not be selected because he had had too much bad luck. Nevertheless, this same employer would expect his pilot to know exactly what to do to save his ship under those same circumstances.

It is true that included in the list of crashes investigated by the Government departments are those of a comparatively minor nature, such as washed-out landing gears, broken wings, bent propellers, and the like. Even such mishaps as these bring unfavorable publicity, although not as widespread as that given the major crashes. It is usually in the major accidents that investigation is hampered by lack of witnesses and that little can therefore be learned.

Recently a large transport plane was forced to land in Boston harbor with loss of only one life and that unnecessary. In the light of that bit of skillful piloting in an emergency, I wonder if two of our other recent tragedies might not have been averted had the pilot set his course over water and put his ship down in the water when forced down. Both planes were on a route along the water, both were flying through bad visibility and under a low ceiling, and both could have continued along and over the water. In either case the pilot probably could have put the plane down in the water with better than a fifty-fifty chance of saving all hands, and yet one crashed into a mountain and burned, and the other flew into high tension wires. It is not my purpose to criticize those pilots. It is possible that they had never considered it possible to land a cabin landplane in the water and get away with it.

There is, however, one group of pilots who, although flying over water most of the time, never give a second thought to forced landings at sea in a landplane. This group is composed of the Naval aviators flying from our aircraft carriers. They have heard of many forced landings in the water, have seen moving pictures of them, and probably have witnessed or experienced actual cases in point. They know enough about landing on water to realize it is comparatively easy to do without injury to personnel. How much of such knowledge drifts to commercial aviation?

Squadrons of planes of both the Army and Navy are often sent on missions miles (*Continued on page* 150)

Yale's Waco Ten

COLLEGE FLYING

Is It Practical?

By Donald Bolton

N. Y. U.'s Eaglerock

IT is a moot question whether the colleges can ever gain any appreciable success with flying and establish it in the universities as a recognized sport activity or pre-industrial training. Until recently it seemed as though the dissenters were right: that the intricacies of finance and organization were too heavy a burden for the immature shoulders of college youth. The successes of a few of the colleges last year have proved, however, that it is not impossible for a school to organize and maintain a flying club if it follows sound practice. Although at present the majority have their feet on the ground and only their minds in the clouds, all indications predict a prosperous and successful future if activities are carefully planned and carried out.

In the past we have heard considerable of the achievements of a few of the college flying clubs, and read much about their growth and successful development. This has been their reward. Although it is a less enjoyable task, I believe that I can accomplish a more useful objective in this article by offering honest *criticism* and *suggestion* than by showering plaudits for past efforts.

At present there are approximately twenty-five organized college flying clubs; of these there are only three having ships exclusively available for club use. Last year New York University used an Eaglerock loaned by Percy Warner, the club founder and winner of the Alexander Award. Yale used an OX Waco, owned by Charles L. Morris, president of the Yale Aeronautical Society. Harvard alone operated a plane which was completely the property of the flying club. Among the others, Michigan and Detroit built and purchased gliders, and made arrangements with outside companies for the use of planes at reduced rates for student instruction. The remainder of the colleges, although they had the organizations, had no ships to fly. They are, however, carrying on with hope high that in some way they will eventually be able to procure equipment, and get into the air.

It would appear therefore that the colleges have done well; they have, but not well enough. Club members have been too disposed to sit back and wait for aid without first organizing their groups efficiently enough to warrant financial assistance. The two most important factors in flying club work are organization and finance. But since money is not donated promiscuously, organization must come before any hope of financial help can be expected.

At present the collegiate flying clubs are more or less dissociate groups operating singly with a common purpose —to promote aviation in the universities and institute it as an accepted activity, and to procure student flying instruction at cost rates. Yet, the most vital necessity is a sound national organization to weld the clubs together into a coördinated and smoothly functioning body. Such an organization could standardize the component clubs into healthy units, and by sheer weight of numbers overcome opposition unconquerable to the single bodies alone. Such an organization exists, but if it is to accomplish these things, it must be reorganized along more efficient lines. This is the Intercollegiate Aeronautic Association, sponsored and approved by the National Aeronautic Association.

The I. A. A. was first formed by a group of eleven colleges at a conference held in Detroit in the spring of 1929. According to the charter its purpose is, briefly:

To maintain a close relationship between the aero clubs; to supervise the organization and operation of intercollegiate aeronautical activities; and to aid the individual clubs in their financial development.

The association is governed by a chairman, and an executive committee composed of delegates from each member club.

Unfortunately, the I. A. A. is practically an impotent body because of the indifference of the colleges, including those which formed it. Although partly the fault of the schools, this condition is largely the result of inherent weaknesses in the association itself. The college clubs ought not to ignore the association; instead they ought to join it, remove its flaws, and work it up into a sturdy organization. That is the only way all of the university groups can be assured of future success.

The I. A. A.'s method of administration is perhaps most subject to criticism. At present the chairman has thrust upon him the entire responsibility of the administration and operation of the association. Being essentially a one-man organization, the body is no more powerful than he is; his weaknesses are the organization's weaknesses. The executive committee might as well be non-existent; it meets but once a year and, during the time at its disposal, receives from the chairman a number of suggestions for motions upon which it votes with little contemplation and no consultation with the individual clubs. Its decisions therefore are unreliable and often decidedly poor. For example, at the last conference held at Ohio State University in Columbus, the executive committee, upon the recommendation of a motion by the chairman, voted an assessment of six dollars for dues upon each individual flying club member holding a Government permit or license, and a dollar and a half upon each non-flying member. This vote practically sounded the death knell of the I. A. A. Every college club except two immediately lost interest because the financial demand was too great. The local clubs contend—and justly—that if they cannot afford to own a ship they certainly cannot pay so much to an organization which is of no immediate help to them, whereas if they do have a ship they need all the money they have to operate it. It is true that money is necessary for the support of any national organization, but there are other ways to provide financial stability for the parent body.

Let us suppose that, instead of having an elaborate home office with several employees and an overburdened chairman, the I. A. A. were to divide the work to be done into assignments to be carried out by each member club. Would not the work be accomplished in a more efficient and less expensive manner? Each club could devote more time and

(*Continued on page* 152)

The PRINCIPLES of AERODYNAMICS

ARTICLE 5—FRICTION *By* Dr. Max M. Munk

AIR friction, like friction in human society, produces heat and diminishes efficiency. The highbrow term for air friction is "viscosity." To say that air is viscous is to say, in plain English, that air has friction.

It is futile for the aircraft designer to delve into the mathematics of air friction, because this mathematics, in its present stage of development, does not yield useful results. Indeed, it is even more nearly true to state that there is not yet a mathematical theory of air friction. The simplest case of a fluid motion governed by friction is that of film between two parallel planes or surfaces, the one fixed and the other moving parallel to it. Very elementary mathematics, even ordinary common sense or average intellect, is then capable of ascertaining what flow will occur. The fluid will move parallel to the planes, as indicated in the accompanying diagram, with a velocity proportional to the distance from the immobile plane. In such a case the relative motion between all layers is equal, and hence there exists equilibrium.

This theory is good and sound, but unfortunately not true for the motion of air. Heavy oil in a thin layer moves in that manner, but air does so only in a layer microscopically thin or at extremely low velocities. Under all other conditions turbulent and irregular motion seems to possess a better and more durable equilibrium than laminar motion. As the velocity or the thickness of the layer is increased, such turbulent motion suddenly makes its appearance and remains. No one knows why; no one can describe in detail the kind of turbulent motion occurring; and no one can compute the point at which laminar changes to turbulent flow. The whole thing is still mysterious. It stands to reason, therefore, that if nobody has succeeded thus far in explaining the flow under simple geometrical conditions, if nobody is able to compute the velocity distribution of the plane turbulent flow or explain why and when the simple plane laminar motion becomes turbulent, we can expect little fundamental and complete knowledge of what goes on in flows governed by less simple geometry, such as the air motions which must be dealt with in aeronautics. Of what use is it to apply mathematics to these more complex problems if we cannot even solve much simpler problems? After all, mathematics is (or should be) nothing more than common sense reasoning brought into a workable system. And if our fundamental and direct knowledge or understanding fails, no amount of higher mathematics will compensate for this failure.

Books, magazines and newspapers are so full of things which science can and does explain, or at least pretends to explain, that it is actually refreshing for a change to discuss a daily occurrence which can easily be observed, which has no mysterious elements in it (like electricity), and which appeals directly to our thinking power, yet cannot be explained by any known form of reasoning. Here is a problem for a future Newton. The theory of relativity is simple when compared with this unknown theory; for there are some people who understand relativity, but there is no one who understands the turbulence of a simple smoke whirl.

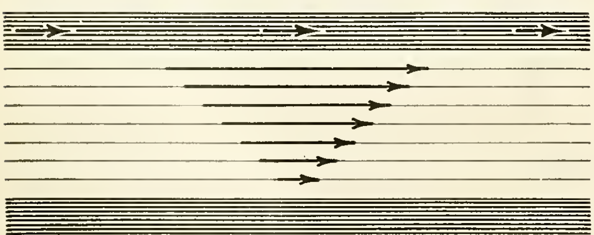


Diagram illustrating plane laminar flow

It is this state of our knowledge—or rather, ignorance—that makes aerodynamics so interesting and attractive. Potential flow is but one possibility out of a hundred, as a first guess. Experience only will tell in each case how far potential flow is realized in nature. And even if we find that it is not realized at all, we at least will have reached the end of guessing and can observe and measure. Pleasant and unpleasant surprises are in store for the investigator on this subject. Every day may bring a new development that will revolutionize the aeronautic art. Here is still virginal soil.

Experience shows that, as a general principle, potential flow is strong and healthy, with little tendency to break down in turbulent disorder in open space. The surface of the aircraft determines the type of flow that will occur. There are regions where turbulence may start or may be prevented. These are the same regions where all kinds of engineering actions can conveniently be measured. It is there that apparently small differences in roughness of the surface or in variations of the shape may be of profound influence on the kind of motion created and thereby on the air forces produced.

Although these things cannot yet be fully understood, at least they can be systematically explored. And as that exploration proceeds, a complete understanding is likely to result automatically. Some day such systematic research will certainly be undertaken, for human curiosity knows no obstacle. The promise of a practical result is enormous, and the expense of such work would amount to only a fraction of the money spent for many other less important research undertakings now in progress. When that time comes we will have a real science of aerodynamics with present aerodynamics as its first chapter. And there will be no blank for the theory of friction. We will then have practical, compact air transport vehicles with small engines and large loadings, contrary to the conditions of our present ships.

In the meantime it is necessary to make the most of what we now know, be it only as preparation for what we shall later add to our knowledge. Even now we are learning a great deal from experiments that have been and are continually being conducted in wind tunnels all over the world. The interpretation of wind tunnel results should take into account the influence of air friction. Although this cannot be done in a perfect way, it can at least be included in the work. We are not completely ignorant about air friction, and what little knowledge we have is that much more precious because of its scarcity and it should be understood even in the drafting room.

We have seen that the square law is absolutely correct

(Continued on page 154)

with no initial dive. A stop watch was used for timing. It required about a mile to pick up speed in level flight before entering the measured course. The motor at that time was turning 2,450 revolutions per minute. Now it turns 2,600 revolutions per minute with the same propeller but I have not had a chance to clock it yet with the increased revolutions. On the five-mile closed course at Chicago, the best official time for a single lap (including the three turns) was 169.65 miles per hour.

There are no radical departures from conventional design or construction in this ship. Its general specifications are:

Specifications

Span	20 feet 1 inch
Length	17 feet 9 inches
Height	6 feet 9 inches
Weight, empty	635 pounds
Gross weight,	900 pounds
Wing chord	48 inches
Wing area (incl. ailerons and axle fairing)	67 square feet
Aileron area	7 square feet
Fin area	3.5 square feet
Rudder area	6 square feet
Stabilizer area	9 square feet
Elevator area	9 square feet
Maximum speed	194.6 miles per hour
Landing speed (approximately)	60 miles per hour
Cruising speed	150 miles per hour
Range	250 miles

ROTOSCOPE FOR OBSERVATION OF MOVING OBJECTS

THE Ashdown Rotoscope (invented by Mr. A. J. Ashdown of London, manufactured in England, and distributed in this country by Livingston and Southard, Inc., New York City) is an instrument operating on the Stroboscopic principle, by means of which the observer's vision is "geared up" to the speed of any rapidly moving object. Periodic motion, whether rotary, oscillatory, vibratory or reciprocating, can be observed and studied with this instrument, and the exact speed of the moving object can be determined without physical contact of any kind with it.

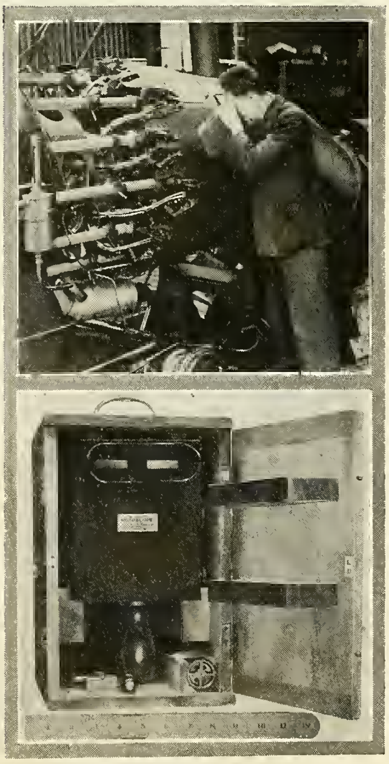
The Rotoscope actually makes a slow motion camera of the observer's eye, by giving a direct view without photography, of objects moving at any speed from 100 to 40,000 movements per minute.

The chief feature of the Rotoscope is the rotary cylindrical shutter which is capable of giving as many as a thousand glimpses per second, which blend into a continuous impression on the retina of the eye. The speed of this shutter can be varied by rapid adjustments with a tiny five-speed gear box. Fine adjustment speed control, to an accuracy within 0.5 per cent, is secured by means of a centrifugal governor. The instrument is compact and light, weighing only six pounds.

With it the observer is able to make readings without the aid of special illumination. It is operated by clockwork and requires no electrical connections. The operator simply holds the instrument in one hand with the shutter apertures to his eyes and controls the speeds with his other hand. By setting the speed of the shutter at exactly the speed of the moving object, the latter appears to be absolutely stationary. Its speed can then be read on the side of the instrument. By increasing or decreasing the shutter speed slightly, slow motion study can be achieved.

Since the introduction of the Rotoscope in England about four years ago, it has been adopted by many leading manufacturers, technical schools, government departments and research associations throughout England and Europe. It is useful for purposes of synchronization; for the determination of speed losses from friction or slip; for the observation of vibration and deflection; in fact, for the detection and elimination of the many mechanical troubles which hinder rapid production.

In the automotive and aeronautical fields, its special applications are in the study of valve and timing motions, springs, shafts, clutches, tire testing, intake manifolds, lubrication problems, gear noises, flutter, vibration, propeller deflection, speed setting, tachometer corrections, synchronization, etc.



The Rotoscope in use and in its convenient carrying case

AIRCRAFT WOODS

WOOD has been one of the pioneer materials in aircraft construction. Its salient qualities—a high ratio of strength to weight; lightness, affording readily the size of member required to resist twisting and lateral buckling; ease of manufacture; facility of repair without specialized equipment and without highly skilled labor; and adaptability to small-scale production—have always permitted it to serve usefully. Although a lack of uniformity in the quality of wood is perhaps the most important factor now militating against its continued use in present-day quantity production, the existing detailed knowledge of the properties and the causes of variation in them, determined at the Forest Products Laboratory and submitted to the National Advisory Committee for Aeronautics for publication, makes it possible to select aircraft material with assurance and places design on a reliable basis.

In N.A.C.A. Report 354, by L. J. Markwardt, strength values of various woods for aircraft design for a 15 per cent moisture condition of material and a three-second duration of stress are presented, and also a discussion of the various factors affecting the values. The toughness-test method of selecting wood is discussed, and a table of acceptance values for several species is given.

This report presents, further, information on the properties of various other native species of wood compared with spruce, and discusses the characteristics of a considerable number of them from the standpoint of their possible application in aircraft manufacture to supplement the woods that are now most commonly used.

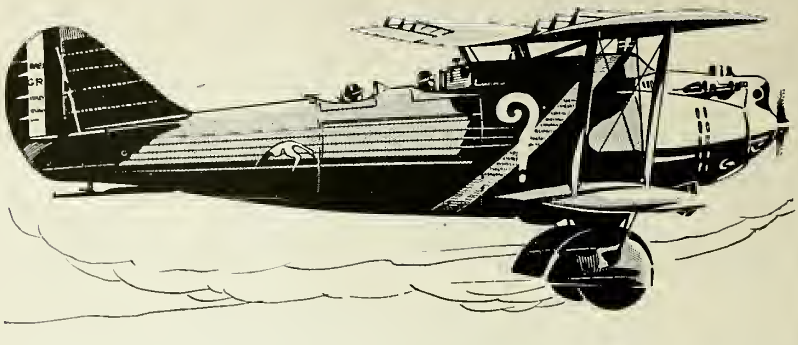
AIRFOIL TESTS

IN order to give the large-scale characteristics of a variety of airfoils in a form which will be of maximum value, both for airplane design and for the study of airfoil characteristics, a collection has been made of the results of airfoil tests made at full-scale values of the Reynolds Number in the variable density wind tunnel of the National Advisory Committee for Aeronautics. They have been corrected for tunnel wall interference and, in N.A.C.A. Report 352, by Eastman N. Jacobs and Raymond F. Anderson, are presented not only in the conventional form, but also in a form which facilitates the comparison of airfoils and from which corrections may be easily made to any aspect ratio.

An example showing the method of correcting the results to a desired aspect ratio has been given for the convenience of designers. In addition, the data have been analyzed with a view to finding the variation of the aerodynamic characteristics of airfoils with their thickness and camber.

TECHNICAL NOTES on the BREGUET "?"

Detailed Information on The Airplane Used by Coste and Bellonte



WHEN the Bréguet airplane *Question Mark* landed in New York after its flight from Paris, a representative of AERO DIGEST was on hand to secure technical information on it. At that time only superficial external data were obtainable. However, our representative had the opportunity of inspecting the plane again as it was being disassembled at Curtiss Valley Stream Airport to be crated and shipped back to France. Many internal structural details ordinarily covered by cowlings, fairings, etc., became visible. During the process of dismantling, the placement of a number of instruments and novel methods of construction were revealed and noted in the belief that our readers will be interested in such details.

In addition to this information a rather comprehensive description of the technical details of the ship was secured from the English magazine, *Flight,* to which publication we are indebted for the greater part of the data incorporated in the following notes:

The *Question Mark* is a further modification of the G.R. (*Grand Raid*) type of Bréguet XIX, embodying several special features for the flights made by Coste and his companion.

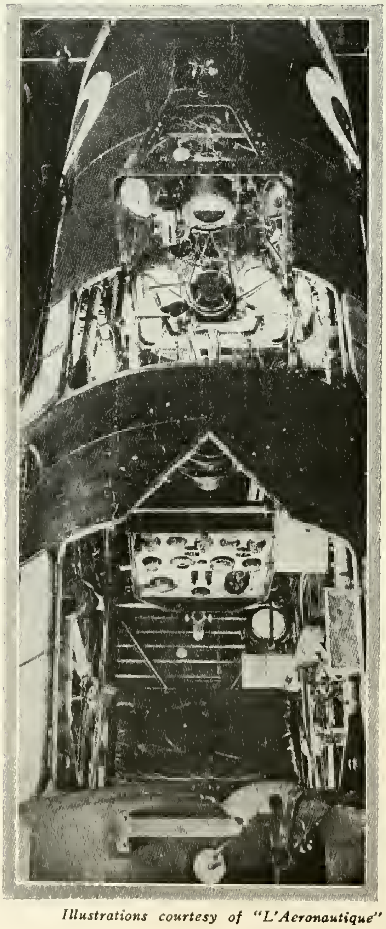
This machine is entirely of duralumin and steel construction, with fabric covering. The form of the wings and of the tail surfaces differs from the former Bréguets in the following particulars. The span of the upper wings is a little greater and the gap between the upper and lower wings has been increased, creating a "cabane" by raising the upper wing above the fuselage. Two pairs of steel struts are used in this plane as braces between the upper and lower wings, instead of the two individual I-struts used in the previous machines.

The engine is a 650-horsepower Hispano-Suiza type 12 Nv water-cooled V, fitted with Scintilla magnetos. The profiles of the upper and lower wings are the same as those of the Bréguet type XIX, and the upper surfaces are rounded elliptically at the ends. The two upper wing panels are joined by a center section having a width of seven feet ten inches.

The framework of the wing cellule comprises a central "cabane" supported by four streamlined struts constructed of special steel and reinforced by two oblique rods and four vertical cables. The interplane bracing consists of the same system of guys and cables as that of the series type Bréguet XIX.

The fuselage is elliptical in cross section. The portion in the vicinity of the wing comprises the main fuel tank, which occupies the entire width of the fuselage, the sides of which are formed by the walls of the tank. Immediately behind this are the seats of the pilot and navigator.

Each cockpit is well protected by windshields, and provided with a complete set of controls. By means of short lengths of rubber shock cord linked to the control system through the medium of adjusting wheels, it is possible to compensate for elevator and rudder loads to relieve the pilot from physical strain from this source. Portions of the windshields and cowling around the cockpits are hinged to permit of easy entrance and egress. The accessories include navigation instruments and other facilities suitable for a flight of 40 to 50 hours. The landing gear is composed of two Bréguet type wheels of cast metal with 1,000-by-225-millimeter tires, mounted on a streamlined axle. Each wheel is covered by a streamlined hood.



Illustrations courtesy of "L'Aeronautique"

A view looking down into the cockpits of the Breguet "?"

The equipment consists of the following:

A radio set for transmitting and receiving, operated by a retractable generator installed in the left side of the fuselage below in the navigator's seat. The radio fittings consist of a generator, sending key, a special S.F.R.A.-81 set suitable for continuous and modulated waves (transmitting on 600-700 meter and 800-900 meter wavelengths and receiving on 450 and 1,550 meter wavelengths); and two 50-watt tubes.

On the right and left sides of the pilot's cockpit and within easy reach of the pilot, sheet metal provision lockers are installed. A tank of drinking water, which can be easily detached, is placed under his seat. In front of the pilot and on each side of him are the engine control lever, the gasoline valves and the brake of the Gyrorector, or blind flying horizon indicator.

The instruments mounted in the pilot's cockpit are:

Thermometer to indicate the temperature of the carburetor at different altitudes (i.e., when heated by exhaust gases); two thermometers to indicate the temperature of the mixture entering the carburetor; Aera incline indicator; Gyrorector with voltmeter; flight indicator; chronograph; anemometer speed indicator; Spirobloc type oil level gauge; Spiroblock fuel level gauges for the inward and rear tanks; two altimeters; one thermometer for water temperature; one thermometer for oil temperature; Amiot oil pressure indicator; fuel pressure indicator; and Morel horizontal compass, with magnifying lens.

Mounted behind the windshield are a Wilhelm Morel anemometer speed indicator operated by a wind-driven propeller:

(Continued from preceding page)

two tachometers, and a Morel vertical compass.

The accessories in the navigator's cockpit include an inclinometer, Morel compass, recording drift indicator with a lens projecting through the fuselage bottom, Alidade bearing indicator and sextant.

Safety equipment includes a seat-pack type parachute for the pilot and a back-pack parachute for the navigator. A pneumatic life-boat, fitted with a pair of oars was also carried. This collapsible boat, made of rubber fabric, can be inflated rapidly by means of a bellows and a bottle of compressed air, and was rolled up and placed in a locker within easy reach of the navigator. A life-buoy inflated in a similar manner, completed the life-saving gear.

The fuel tanks are constructed of riveted sheet duralumin. They have a total capacity of 5,175 liters. The main fuel tank, which is built in as part of the fuselage, consists of two subsidiary tanks, one behind the other. One of these contains 2,990 liters of gasoline of .720 specific gravity and the other, which has a capacity of 720 liters, carries a mixture of gasoline-benzol having a specific gravity of .780.

A sump, fitted with a trap, serves both these reservoirs in common. Communication with the first reservoir can be cut off by closing a cock.

Other fuel tanks are installed in the upper wings. They comprise an auxiliary feed tank of 110 liters situated in the center section between the wing panels and three tanks situated in each of the upper panels (making six in all). Two of these wing reservoirs have a capacity of 195 liters each, and the four others carry 240 liters each. These reservoirs are installed between the longerons, and their walls form ribs in the wings.

Two other tanks having the form of pontoons were mounted on the under side of the lower wings directly underneath each pair of struts. Each of these tanks had a capacity of 200 liters and could be emptied by means of a hand pump worked by the navigator. At the last moment, however, before taking off from Le Bourget, Coste decided that the additional fuel was not needed and these tanks were removed.

The fuel pump of the engine draws from the sump installed in the large tank of the fuselage; the wing reservoir empties into this main tank. The carburetors are fed directly by the auxiliary feed tank in the wings, the overflow leading into the large tank.

The two main tanks can be emptied instantly by means of two large dump valves which can then be closed again. The air intakes of the reservoirs in the wings are connected by a piping fitted with cocks and joined to the piping of the large tank. This is done so as to avoid all loss of gasoline by siphonage or evaporation. A cock which closes all the piping connecting these air intakes assures the water-tightness of these tanks in case the plane is forced down on the water.

The lubricating oil circulation system comprises two tanks of a total capacity of 49 gallons and a radiator. They are located forward of the gasoline tanks, one on each side of the engine. The water circulation system comprises (in addition to the retractable radiator and the usual auxiliary feed tank) a supplementary auxiliary feed tank of 3½-gallon capacity. This latter tank can be connected at will to the water pump, so as to compensate for losses occurring from evaporaion during flight.

Specifications

Dimensions	
Length overall	35 feet 2 inches
Wing span (upper)	60 feet 0 inches
Wing span (lower)	37 feet 8 inches
Height overall	13 feet 4 inches
Span of tail	16 feet 2 inches
Height of rudder	7 feet 3 inches
Wheel track	8 feet 3 inches
Areas	
Upper wing	493 square feet
Lower wing	173 square feet
Total wing area	666 square feet
Stabilizer	30.8 square feet
Elevators	55.5 square feet
Fin	15.2 square feet
Rudder	17.5 square feet
Fuselage, max. cross-section	20.8 square feet
Weights	
Tare weight of machine	4,820 pounds
Fuel and oil	9,375 pounds
Useful load	550 pounds
Gross weight at start	14.745 pounds
Power loading	22.7 pounds per horsepower
Wing loading	22.17 pounds per square foot

New Type Jaeger Airplane Clocks

TWO new models have just been added to the Jaeger line of airplane clocks by the Jaeger Watch Company, Inc., New York City, associate of Jaeger, Paris and Geneva and London. These are both Chronoflite models with split second hand (indicating in fifths of a second) and elapsed time dial with hour and minute hands, one model for general airplane, speed boat and motor car use and the other for special equipment on the new Cadillac series.

As well as being used for aeronautical timing, these new Jaeger Chronoflites can be used for timing airplane races, eliminating guesswork as to elapsed time or speed. Movement is eleven jewels—eight days—bimetallic balance.

Jaeger "Chronoflite" model

The new models are finished in black, with dials black with white figures and hands. Bezels can, however, be supplied in chromium and the figures and hands treated with radium.

METALS USED IN AIRCRAFT INSTUMENTS

IN N.A.C.A. Report 358, by W. G. Brombacher and E. R. Melton, experimental data are presented on the variation of the modulus of rigidity in the temperature range —20 to +50 degrees Centigrade, of a number of metals which are of possible use for elastic elements for aircraft and other instruments. The method of the torsional pendulum was used to determine the modulus of rigidity and its temperature coefficient for aluminum, duralumin, Monel metal, brass, phosphor bronze, coin silver, nickel silver, three high carbon steels, and three alloy steels. The temperature coefficient m is defined by the relation

$$m = \frac{1}{G_0} \frac{dG}{dT}$$

in which G and G_0 are the moduli of rigidity at the temperatures T degrees Centigrade and O degrees Centigrade. The differential dG/dT was found to be a constant except for two metals. The effect of heat treatment on m was determined for a number of the materials. It was observed that tensile stress affected the values of the modulus by amounts of one per cent or less.

Report 358 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

COMPASS COURSE and SPEED INDICATOR

THE main features claimed for the Kennedy Compass Course and Ground Speed Indicator are the possibility of determining (1) required air speed to arrive at destination at prearranged time, (2) required magnetic course to correct for winds, (3) drift, velocity and wind direction, and (4) any problem in dead-reckoning. The instrument is intended for students of avigation, for pilots who do considerable cross-country flying, and for schools which teach avigation.

If the instrument is set at the ground speed required to reach a destination at a certain time, and the wind arm on the instrument employed, it is possible to see at all times what the required air speed is.

By utilizing wind and weather forecasts obtained before a flight, and by setting the wind arm during flight, the instrument will indicate the required course to be flown. In figuring ground speed in order to determine drift, the best method is to employ a small circular slide rule.

BRITISH FIGHTING PLANES

(Part One)

Paul E. Lamarche

THE aircraft used by the Royal Air Force of Great Britain today are in striking contrast with those used during the last war, for the years that have passed since hostilities ended have witnessed a remarkable development in the construction of fast and efficient military types that have enabled Great Britain to maintain her position as one of the leading air powers of the world. There are probably many of our war pilots today in America who can well remember such venerable craft as the Bristol Fighter, the Sopwith Camel and the D.H. 9 and who have probably wondered at times what types of military craft are now being produced by the British aeronautical industry to replace these famous mechanical heroes of a decade ago. Even now one occasionally sees some of these older types still flying in England. There is, for instance, one squadron which still uses the "Brisfit," as the Bristol Fighter is popularly known.

Today British military planes, with their modern all-metal constructions and high-powered supercharged engines, represent a concentrated effort to build up an air fleet equal or superior to any other in the world. With its high performance pursuit planes and interceptor fighters, the British home air force is certainly sufficiently well equipped to offer an adequate defense against any attacking force. Moreover, its day and night bombers are potentially capable of penetrating into enemy territory and inflicting great damage in time of hostilities. Since the British Empire reaches to all corners of the world, it has been necessary to develop aircraft for both civil and military purposes that are adaptable to all climates and conditions. Nor have British engineers been unsuccessful in meeting the requirements demanded of their products. In an empire as extensive as that of Great Britain, the air fleet has had adequate opportunity to prove itself as indispensable as, and far more economical than, the naval fleet as a means of preserving law and order in its distant domains. In some recent instances British war planes have been more effective against local uprisings when "a bomb to the wise is sufficient" than a light cruiser could have been, even at a greater expense. Although the Royal Air Force is represented on the sea as on the land, the land force is often able to perform some of the duties of a landing party from a naval vessel by the use of its large Vickers troop carriers which can swiftly transport 22 fully armed men to suppress any minor uprisings among natives under British mandate. On a similar mission it would normally take a detachment of troops so much longer to reach the scene of a disorder by a motor lorry or other means that in the elapsed time much more serious damage might have been incurred.

Several of the modern aircraft types now used by the home force, such as the Handley-Page and the Vickers bombing planes, have been developed from well-known planes used during the war, though most of the present types constructed in England are of post-war conception. In some cases they are built by firms which have been established since the signing of the armistice. Excluding training and naval aircraft, the principal planes used by the Royal Air Force are (according to their functions) the single-seater fighters, interceptor fighters, Army coöperation planes, general purpose planes, day bombers, high performance bombers and night bombers. In this article I am describing the single-seater fighters, or pursuit ships as we know them, and the interceptor fighters. The latter are single-seater planes designed to operate at high altitudes to intercept the modern fast day bombers. They have been described by a well-known English writer-aviator as, "mere guns and engines with pilots clamped to them which can jump to 20,000 feet in 12 minutes 15 seconds and at that height develop speeds of 198 miles per hour." They are, in other words, the highest performance war machines produced in England. Since the modern fast day bomber can invade a country at an altitude in excess of 20,000 feet and at a speed greater than 160 miles per hour, the interceptor fighter in order to be of any practical use must be able to operate effectively at high altitudes and develop a speed considerably faster than that of the invader.

Principal among the single-seater fighters used by the Royal Air Force are those built by Armstrong-Whitworth, Bristol and Gloster. A number of single-seater planes have been built in England for foreign governments.

Several new fighting planes are at present being tested by His Majesty's Air Ministry. Because much secrecy surrounds the performances of these planes, and in particular the newest of the interceptor fighters, I am unable to give more than the merest description of them in this article.

The military loading on the fighting planes usually includes two Vickers machine guns, bomb racks for four 20-pound fragmentation bombs, a short-wave wireless set, oxygen apparatus, night flying equipment and the usual signals. The interceptor fighters carry less equipment because they are called on for higher performance.

Some time ago a competition for interceptor fighters was held at Martlesham Heath and a number of interesting new planes were entered, among them several low-wing monoplanes. Considerable interest was manifested in these low-wing fighters because ot their high speed, though they did not maneuver as well as the biplanes. The result was that the Hawker "Hornet" and the Fairey "Firefly" took first honors after successfully passing the required tests. Besides having good high altitude performance, both of these planes are considered by British experts as the fastest of their type in the world today. As yet, however, performance information remains an Air Ministry secret, though it appears from unconfirmed rumors that both of these planes can do better than 200 miles an hour at maximum speed. Both planes are built around the same engine and it is said that the designs of their fuselages were taken from those of the Schneider Cup planes.

It will be seen from the following descriptions that most of the British single-seater fighters are biplanes. I understand, however, that there has been no little controversy on whether or not the monoplane is faster and just as efficient. As against the claims for the monoplane's higher speed is the theory that the biplane is more manueverable and generally capable of a higher performance despite the resistance created by necessary interplane struts and bracing wires. Some will say that British engineers are too conservative and old-fashioned in their designs, but the fact remains that the biplanes produced by the British industry are capable of performances that seem to justify their designs. A characteristic of the British single-seater biplanes is the depth of the fuselage around the cockpit and the downward inclination of the top of the fuselage towards the nose to afford the pilot excellent visibility forward.

The British fighting planes are metal in construction with fuselages built up in two or three easily demountable sections to facilitate transportation or storage. British aircraft constructors have made great progress in the use of metal since the war, and such firms as Gloster, and Boulton and Paul (the latter built much of the metal framework of the R.100 and the ill-fated R.101) are well known for their metal constructions. Practically no welded structures are produced in England, rivets and bolts being used on joints or intersecting members of the wings and fuselages. Drawn steel of high tensile strength is employed more extensively than duralumin.

The British engine manufacturers have developed a number of dependable power plants since the war, principal among which, as used on fighting planes, are those built by Armstrong-Siddeley, Bris-

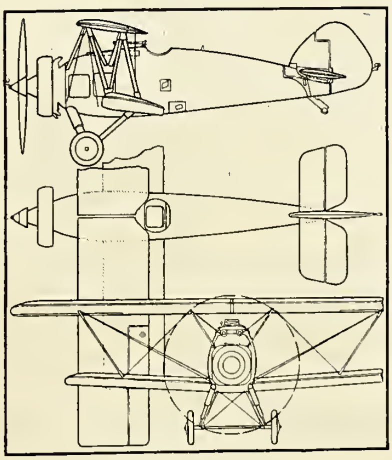
The Armstrong-Whitworth AW XIV Fighter and the Siskin of metal construction

tol, Rolls-Royce and Napier. Armstrong-Siddeley produces two high-powered radial air-cooled engines—the "Jaguar" and the "Jaguar-Major." The Jaguar is a 14-cylinder engine rated at 460 to 500 horsepower. The King's Cup Race in England has been won four times by planes powered with this engine. The Jaguar Major, a more powerful version of the Jaguar, is also a 14-cylinder engine. It is geared and supercharged and develops 525 horsepower at 3,000 feet altitude and 500 horsepower at 11,500 feet. With the supercharger and accessories, this engine weighs 996 pounds. The Blackburn "Lincock" single-seater fighter uses an engine of lower power, the Armstrong-Siddeley "Lynx," rated at 225 horsepower. The Bristol Aeroplane Company builds two air-cooled engines used on fighting planes known as the "Jupiter" and the "Mercury." Both engines have nine cylinders. The Jupiter Series IX.F has a rating of 515 to 550 brake horsepower. The Mercury is an Air Ministry secret and information on its power rating is not available.

The principal Rolls-Royce engine used on these planes is the Type F, a 12-cylinder water-cooled engine which has two blocks of six cylinders in V. The shape of this engine, which is rated at 480 to 490 horsepower, lends itself to a well streamlined nose as can be seen in the illustrations of the Fairey Firefly, the Hawker Hornet and the Westland "Wizard" which will appear in the second part of this article. The new Halford-Napier H-shaped air-cooled engine is one of the most interesting power plants produced in England during 1930. It was designed by Major F. B. Halford, who is also the designer of the successful "Cirrus" and "Gipsy" light airplane motors. Built in the form of an H, this new engine has four blocks of four cylinders each vertically opposed and is equipped with a supercharger for high altitudes. It has two crankshafts side by side with a central gear and the surprisingly small frontal area of but 21 inches. Although this engine is still an Air Ministry secret, it is known that its power is approximately 300 horsepower and is dry weight is 620 pounds. It is fitted with a reduction gear. This new Napier engine is at present being tested on a new low-wing monoplane recently built by DeHavilland, about which little information is at present available. Practically all of the engines used on the high performance planes in England are geared and supercharged, and the Townend Ring is used on many of the air-cooled radial engines to reduce drag and increase speed. On most of these planes the engines are fed by gravity, and in many cases the planes have two tanks, a main tank and a service tank.

The Air Ministry has decided on a change in the naming of aircraft adopted for use by the Royal Air Force. Up to the present service aircraft have borne names which were not chosen on any generally applied system, and the official view was that the position needed simplification. Aircraft are now divided into classes according to their main service function and to each class is allotted a distinctive letter of the alphabet which must be the initial letter of the selected name. Thus all adopted land fighters must have names beginning with "F," all adopted fleet fighters names beginning with "N," all single-engined bombers with "P," troop carriers with "C," and so forth.

This new scheme was devised to assist fighting men in memorizing the aircraft types in use and to simplify the transmission of telephoned or wirelessed messages under war conditions. The first aircraft to be re-named under this system is the Hawker Hornet interception single-seater biplane, recently adopted for service in certain squadrons of the Royal Air Force. As a land fighter the Hornet in service must henceforth carry a name beginning with "F" and after long discussion the selected word is "Fury."



Armstrong-Whitworth AW XIV

ARMSTRONG-WHITWORTH

Sir W. G. Armstrong-Whitworth Aircraft, Ltd., located at Whitley, near Coventry, was established in 1921 and is affiliated with Armstrong-Siddeley Motors, Ltd. Recently A. V. Roe and Company combined with this well-known firm, which has for some time been concentrating on the construction of all-steel military craft. Besides its military planes it also builds the large trimotor 20-passenger "Argosy" used by Imperial Airways on commercial routes. The "Siskin" and the new single-seater fighter, known as the Type AW XIV, are standard fighting planes in the R.A.F. They are somewhat similar in design, the Type AW XIV carrying a lighter military load and having a higher performance.

Armstrong-Whitworth Siskin

The Siskin, introduced in 1927, is a standard single-seater fighter of all-metal construction. It is fitted with the Armstrong-Siddeley Jaguar or Jaguar Major. It is a single-bay sesquiplane the wings of which have a total area of 293 square feet, the lower wings having one-third the area of the upper. The upper wing is built up in two sections, which are joined together over the center line of the fuselage and carried by four splayed-out struts. The lower wings are attached to wing roots built integral with the fuselage. The wings are of steel construction, fabric covered. The top plane is built up with two longerons the structure of which consists of two lengths of rolled steel strip which form the webs, with top and bottom flanges of drawn strip which are attached by rivets and turned-over edges. The ribs are of Warren truss form and there are five tubular compression struts in each top wing section, as well as the usual cross bracing members. The lower wings are built up around a single tubular spar. The wings are externally braced by a set of V-struts on both sides and by two interplane lift wires and one landing wire on each side.

The fuselage, which is built up in two sections joined immediately behind the cockpit, has a tubular steel structure consisting of four longerons and the usual cross and vertical bracing members. With

(Continued on following page)

(*Continued from preceding page*)
the exception of the forward part, it is covered with fabric. The empennage is of the normal monoplane type, built up of steel frames fabric covered. The rudder is balanced and the stabilizer is adjustable in flight. The landing gear is of the cross-axle type in V and has two vertical struts fitted with shock absorbers and carrying the axle which is braced by V-legs from behind. The armament of the Siskin consists of two standard Vickers guns in the top cowling which fire through the propeller and it can be equipped further with racks for four 20-pound fragmentation bombs. A shortwave radio set, oxygen tank, compressors and a parachute are also included in the military loading.

Specifications

(*With geared and supercharged Armstrong-Siddeley Jaguar Major with Townend Ring*)

Span	33 feet 2 inches
Length	25 feet 4 inches
Height	9 feet 8 inches
Chord, upper wing	7 feet
Chord, lower wing	3 feet 6 inches
Gap	5 feet
Wing area	293 square feet
Total weight	3,180 pounds
Speed at 10,000 feet	181 miles per hour
Speed at 15,000 feet	186.5 miles per hour
Speed at 20,000 feet	185.5 miles per hour
Speed at 25,000 feet	180.5 miles per hour
Landing speed	60 miles per hour
Climb to 10,000 feet	6.5 minutes
Climb to 15,000 feet	9.25 minutes
Climb to 20,000 feet	12.75 minutes
Climb to 25,000 feet	17.75 minutes
Absolute ceiling	33,800 feet
Service ceiling	32,700 feet

Armstrong-Whitworth Type AW XIV

The Type AW XIV is analogous to the Siskin but, with the geared Jaguar Major, is a higher performance machine, having a maximum speed of 200 miles per hour at 15,000 feet.

It is also equipped with the Townend Ring. This plane can reach an altitude of 25,000 feet in 17 minutes 25 seconds and has a service ceiling of 33,100 feet.

Bristol "Bulldog," Standard Pursuit Plane of the R.A.F.

Its staggered wings of unequal span and chord are of the single-bay type, being externally braced on either side of the fuselage by a set of N-struts. Like the Siskin, the upper wing is in two sections joined at the center line where they are carried on splayed-out struts. The wing structure consists of two steel longerons of corrugated strip whose webs and flanges are riveted together. The unbalanced ailerons are on the upper wing only. The fuselage has a rectangular structure of steel tube which is braced by steel tie-rods. It is built up in two demountable sections which are joined behind the cockpit. The armament of the AW XIV consists of the standard two Vickers machine guns firing through the propeller while the military equipment also includes a radio set. The engine is fed by gravity from a 50-gallon fuselage tank which gives the plane an endurance of two hours.

Specifications

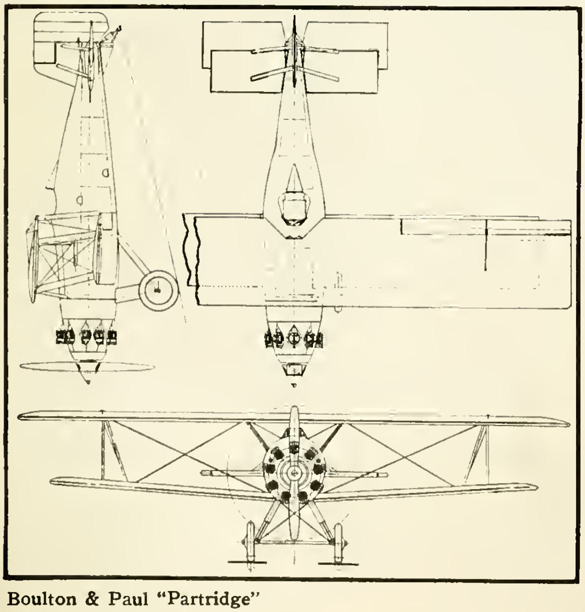
(*With geared and supercharged Armstrong-Siddeley Jaguar Major with Townend Ring*)

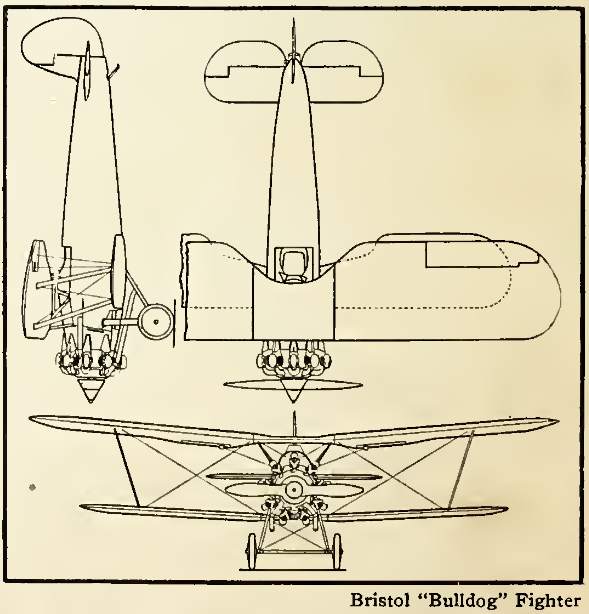
Span, upper wing	31 feet 4 inches
Span, lower wing	23 feet 9 inches
Length	25 feet 2 inches
Height	10 feet 6 inches
Chord, upper	5 feet
Chord, lower	4 feet 3 inches
Gap	4 feet 6 inches
Total wing area	246.4 square feet
Aileron area	25.56 square feet
Track of landing gear	5 feet 11 inches
Total weight	3,235 pounds
Speed at 10,000 feet	194 miles per hour
Speed at 15,000 feet	200 miles per hour
Speed at 20,000 feet	198 miles per hour
Speed at 25,000 feet	192 miles per hour
Landing speed	60 miles per hour
Climb to 10,000 feet	6.5 minutes
Climb to 15,000 feet	9 minutes
Climb to 20,000 feet	12.25 minutes
Climb to 25,000 feet	17.25 minutes
Absolute ceiling	34,300 feet
Service ceiling	33,100 feet
Endurance	2 hours

BRISTOL

Bristol Bulldog

The Bristol Aeroplane Company, Ltd., of Bristol, is well known for its fighting planes produced during the war and is one of the oldest firms in England, having been established in 1910. At present the company is producing the "Bulldog," an all-metal single-seater fighter which has been adopted by the R.A.F. as a standard pursuit ship. The firm is also known as the manufacturer of Bristol air-cooled engines. The Bulldog is a single-bay bi-


Boulton & Paul "Partridge"


Bristol "Bulldog" Fighter

plane designed after the Bristol principles of metal construction, most of the structure being of high tensile steel. It is normally powered with either the Bristol Jupiter Series VII or VI supercharged engine. With the former it has a top speed of 177 miles per hour at 10,000 feet with its maximum permissible loaded weight of 3,350 pounds.

The upper wing, which has an area of 193 square feet, is built up in two sections which are attached to a center section supported over the fuselage by N-struts. The lower wing, with an area of 115 square feet, is in two sections attached to short wing roots. The ailerons, on the upper wing only, are of the Frise type and are actuated by control cables passing through the lower wings behind the rear spar and to the aileron levers by wires. The wings are externally braced by a set of steel struts and wires on either side of the fuselage. The wings are built up with box spars of steel which are connected by steel compression members braced by tie-rods. The ribs are of steel strip channel sections riveted together.

The fuselage has an oval form and is built up in three sections. The nose of the plane has a metal covering; the rear section aft of the cockpit is covered with fabric. The forward part, which includes the cockpit and the military equipment, has a tubular steel structure. The rear portion is of steel strip. The fuselage is deep around the cockpit. The latter is well arranged for good visibility and contains a duralumin bucket parachute type seat which is adjustable in flight over a vertical range of 4½ inches.

The empennage is of the monoplane type with an adjustable tail plane and a balanced rudder. It is built up with steel frames fabric covered. The landing gear is of the cross-axle V type, the front legs of which are equipped with rubber-oleo shock absorbers.

Two fuel tanks of 35-gallon capacity each are carried in either side of the center section of the wing, the carburetors being fed by gravity. Oil is carried in a tank suspended from the bottom fuselage longerons immediately behind the fireproof bulkhead. The Bulldog has an armament of two Vickers guns carried on either side of the fuselage and firing through the propeller. Radio, oxygen apparatus, gun sights and full electrical equipment are also included in the military loading.

Specifications

(With Bristol Jupiter Series VII engine.)

Span	33 feet 10 inches
Length	24 feet 10 inches
Height	10 feet 10 inches
Chord, upper wing	76 inches
Chord, lower wing	57 inches
Total area	306.5 square feet
Total disposable load	1,038 pounds
Total weight loaded	3,318 pounds
Fixed military equipment	115 pounds
Fuel (70 gallons)	532 pounds
Oil (8 gallons)	80 pounds
Maximum permissible weight	3,350 pounds
Speed at 10,000 feet	177 miles per hour
Speed at 13,000 feet	175 miles per hour
Speed at 16,500 feet	172 miles per hour
Climb to 3,250 feet	2.4 minutes
Climb to 6,500 feet	4.4 minutes
Climb to 10,000 feet	6.7 minutes
Climb to 13,000 feet	8.6 minutes
Climb to 16,500 feet	11.3 minutes
Absolute ceiling	29,300 feet
Service ceiling	28,000 feet

The performances given above are with total loaded weight of 3,350 pounds.

BOULTON AND PAUL

Boulton and Paul Partridge

The well-known firm of Boulton and Paul, Ltd., of Norwich, which specializes in all-metal aircraft, has produced an interesting high performance single-seater fighter known as the "Partridge," which is fitted with a geared supercharged Bristol Jupiter Series VII engine. It is a single-bay staggered biplane the lower wings of which have a four-degree dihedral. Both upper and lower wings are built in two sections, the upper wing sections being joined at the center line and carried by four splayed out struts. The wing bracing consists of two pairs of interplane struts, one on either side of the fuselage and the usual streamline wire cross bracing. Frise type ailerons are fitted to both upper and lower wings. The wings are all-metal in structure, built up of high tensile steel spars and duralumin ribs fabric covered.

The fuselage is in two sections, the forward part carrying the engine mount, tanks, wing attachments and cockpit. Its structure is of solid drawn high tensile steel tubes; that of the tail section is composed of Boulton and Paul "closed joint" tube longerons with steel and duralumin struts of the same section. Over the bay which includes the cockpit, the top longerons are solid drawn tubes of large diameter and serve to support the two Vickers guns without additional structure. At the same time they are sufficiently strong to prevent telescoping of this section in a crash. In form the fuselage structure is rectangular, but a light duralumin fairing produces an oval section. The forward part has a metal covering and the tail section fabric.

The tail unit is of the normal monoplane type with an adjustable stabilizer and balanced elevators. There is also a small fin below the fuselage. The landing gear is of the cross-axle V type. The pilot's cockpit, placed under the cut-out in the upper wing, contains an adjustable seat. The standard military loading, including wireless, is carrried. Fuel is carried in two fuselage tanks, a main tank and a service tank. Oil is carried in a combined tank and oil cooler on the starboard side of the fuselage.

Specifications

(With Bristol Juipter Series VII supercharged engine)

Span, upper wing	35 feet
Span, lower wing	31 feet
Chord, upper	5 feet 6 inches
Chord, lower	4 feet 6 inches
Length overall	23 feet 1 inch
Height	11 feet
Track of landing gear	5 feet 6 inches
Total wing area	311 square feet
Weight empty	2,021 pounds
Weight of fuel (62 gallons)	471 pounds
Weight of oil (5 gallons)	55 pounds
Military load (including pilot)	550 pounds
Total weight loaded	3,097 pounds
Wing loading	9.9 pounds per square foot
Power loading	7.35 pounds per horsepower
High speed at 10,000 feet	167 miles per hour
High speed at 20,000 feet	164 miles per hour
Climb to 10,000 feet	6.5 minutes
Climb to 20,000 feet	15.06 minutes
Service ceiling	29,000 feet

(This article to be continued next month)

EX-CELL-O DIAMOND BORING MACHINE

THE Ex-Cell-O company has developed a new diamond boring machine for precision boring in modern production. In addition to its use in the finish boring of holes with diamond or tungsten carbide tools, the machine is so designed that on the same machine with a single loading and a single fixture, rough boring and finish boring may be accomplished.

The machine is full hydraulic, operating under 100 pounds pressure per square inch. The hydraulic system and valves were specially developed by Ex-Cell-O for this machine. Flexibility and versatility are insured by full hydraulic operation permitting speeds and feeds to be quickly changed. Any operating program can be had by relocating the fast speed, slow speed and table reversing dogs on their mounting bar.

The manual control valve for starting and stopping the machine is located in the center of the machine convenient for the operator. By means of this control valve, the machine may be stopped by the operator at any point in the operating cycle without disturbing the automatic cycle of the machine. When the valve is again engaged the remainder of the cycle is completed. The spindles on each bridge are equipped with limit switches and individual brakes hydraulically operated. When the cut is completed and the table is ready to reverse, the limit switch is disconnected and the brakes applied, stopping the spindle, while the work returns and the cutting tool is backed out of the work.

The complete machine is used for rough and finish boring of three pistons simultaneously, the three splindles located at one end of the machine carry roughing tools while the three spindles on the opposite end of the machine carry the finishing tools. A full hydraulic fixture for holding the pistons is used and is operated directly from the hydraulic unit on the machine proper.

With this type of construction, pistons up to three in number can be rough and finish bored in one setting. Finish boring may also be accomplished with suitable fixtures, by boring at one end of the machine while loading a new piston or rods at the other end or they may be rough bored at one end and finish bored at the other end.

SIKORSKY S-41 AMPHIBION

THE first of a new series of Sikorsky amphibions, the S-41, has been delivered by the Sikorsky Aviation Corporation to Pan American Airways for service in Central and South America. This ship is perhaps the largest existing amphibion in the world, although considerably smaller than the new Sikorsky S-40, four-engined, 45-place amphibion, two of which are now under construction in the Bridgeport plant for delivery early next year to Pan American Airways.

The Sikorsky S-41 amphibion is an externally braced monoplane cabin flying boat with retractable landing gear. Power is furnished by two Pratt and Whitney Hornet engines of 575 horsepower each. The ship carries 9 to 14 passengers, in addition to a crew of two, and has ample space for luggage and mail.

The design of the S-41 amphibion follows generally, though on an enlarged scale, that of the S-38. It incorporates several improvements, however, as a result of two years' experience with the S-38 under all operating and climatic conditions.

The hull of the S-41 is of all-metal construction, covered with Alclad sheets, with clean entrance lines and a high bow, giving good taxying, take-off and landing characteristics, and reducing spray. The hull was constructed to be suitable for operation in open sea. It is divided into five watertight compartments, and all parts of the hull are easily and quickly accessible.

Visibility for both the pilots and the passengers is said to be good, and the cabin provides ample space and headroom, good ventilation, and a spacious toilet. Entrance to the cabin is through a hatch in the roof and a swivel staircase in the cabin.

The outboard pontoons are all-metal, similar in construction to the hull, and are interchangeable. Each pontoon is divided in three water-tight compartments.

The wing is of standard Sikorsky construction, built up of open duralmin truss sections, covered with fabric. The wing consists of three panels, the outer panels being attached to the center panel at a dihedral angle of 1.5 degrees. Gasoline and oil are carried in the center panel. The ailerons are balanced.

The tail unit is attached to the wing by two outriggers, forming an entirely separate unit from the hull. This arrangement permits the use of a high aspect ratio stabilizer, and places each of the compensating rudders directly in the slipstream of the corresponding engine. The high position of the tail unit protects it from danger in maneuvering on rough water or on land. The compensating action is obtained through an unsymmetrical arrangement of the rudders, patented by the Sikorsky company, and permits control and maneuverability when flying on one engine.

The stabilizer is adjustable in flight 4.5 degrees either side of the neutral position.

The struts are streamlined duralumin and steel tubing, and some of the larger struts are built up with detachable fairings. All fittings are concentric—i. e., all stresses pass through the exact point of intersection of neutral forces of the members involved. Single and multiple tongue fittings are used, depending on requirements, each fitting being equipped with a single or double joint, thus reducing weight without sacrificing strength, minimizing vibration, and diminishing the possibility of metal fatigue.

The landing gear consists of two retractable landing wheels with Sikorsky brakes, and a tail wheel. Landing shocks are taken up by Oleo shock absorbers with coiled springs, located within the retraction strut pistons, the oil in the retraction struts being used for retraction only.

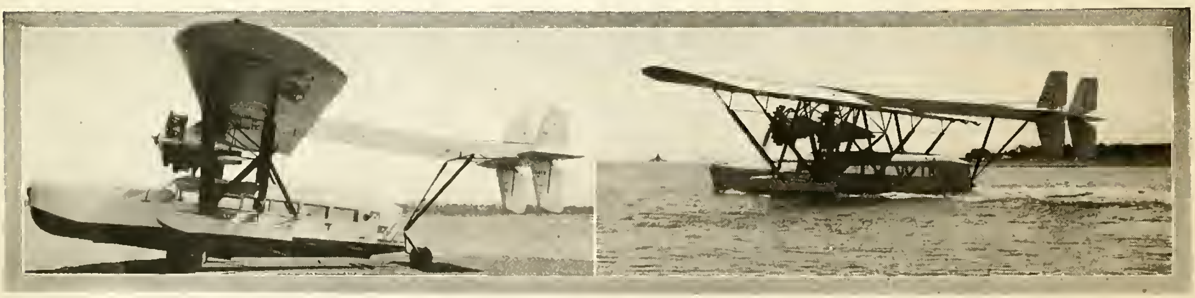
Specifications

Span	78 feet 9 1-4 inches
Length overall	45 feet 2 3-4 inches
Height (wheels down)	15 feet 3 5-8 inches
Length of hull	33 feet
Ream of hull	84 inches
Height of hull	84 inches
Gross displacement of hull	25.6 tons
Wing chord	115 inches
Span of aileron	151 inches
Total wing area	729 square feet
Total horizontal tail surface area	94.5 sq. ft.
Total vertical tail surface area	40.2 sq. ft.
Fuel (400-mile range)	300 gallons
Fuel (600-mile range)	450 gallons
Weight empty	7,500 pounds
Useful load	5,000 pounds
Gross weight	12,500 pounds
High speed	125 miles per hour
Cruising speed (sea level)	110 mile per hour
Stalling speed	61.5 miles per hour
Climb in 10 minutes	7,500 feet
Service ceiling	16,500 feet

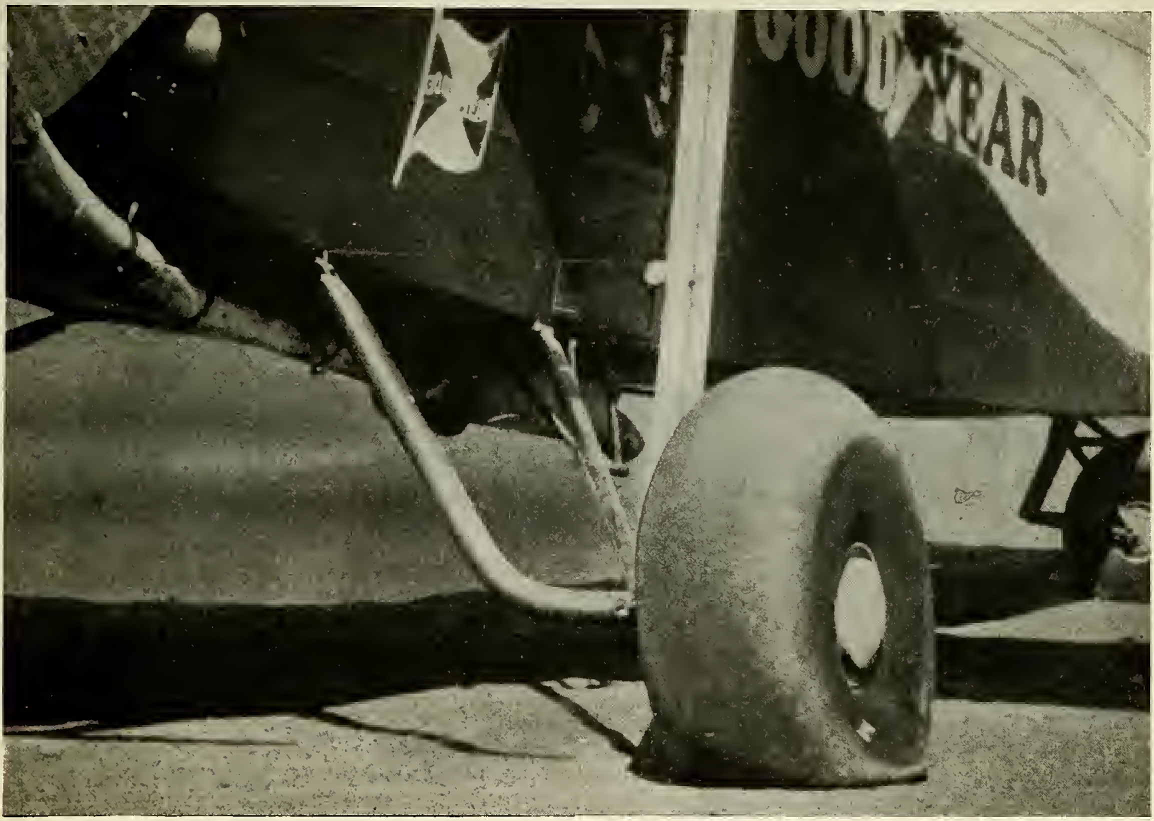
NEW WASP PRODUCED

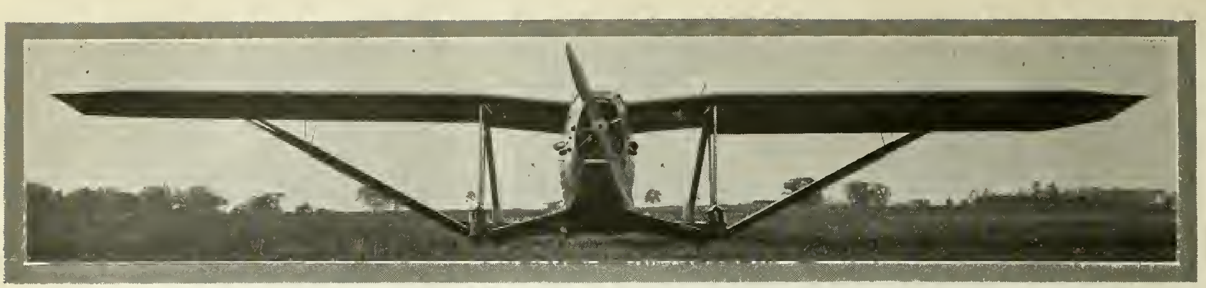
A MODERATELY supercharged Wasp engine rated at 450 horsepower at 2,100 revolutions per minute with a 10:1 blower drive ratio which gives sea level operation at an altitude of approximately 5,000 feet, is now available for airplane manufacturers, according to E. B. Haines, assistant sales manager of the Pratt and Whitney Aircraft Company, East Hartford, Conn. This engine has the Department of Commerce Approved Type Certificate No. 58.

An engine of this character should prove of great benefit to air transport operators flying over country where high altitude flying is essential.



The newest Sikorsky S-41 Amphibion which carries from 9 to 14 passengers and crew





BELLANCA "BLUE STREAK" TANDEM

MORE than a year ago, the Bellanca Aircraft Corporation, New Castle, Delaware, completed and made test flights with an airplane of very unusual design. This ship, which was a twin-engined sesquiplane called the Bellanca Tandem because of the arrangement of its engines, was described in detail in the October 1929 issue of AERO DIGEST in an article by Richard M. Mock. As may properly be expected with an airplane departing so widely from conventional design—particularly one built under Mr. Bellanca's characteristically painstaking and thorough supervision—a period of several months was devoted to study and analysis of the structure and performance of the plane with the purpose of adding improvements wherever possible. As a result the Bellanca company recently announced a revised model of the Tandem incorporating several changes, principal of which is the substitution of Curtiss Conqueror water-cooled engines for the two air-cooled powerplants with which the ship was formerly fitted.

Water-cooled engines are used because of inability to find a suitable cowling that would properly cool two radial engines when mounted in tandem. The Conqueror engines are rated at 625 horsepower each. The forward engine, geared two to one, drives a tractor propeller. The rear engine, geared seven to five, and connected by a shaft running through the short fuselage, drives a pusher propeller. The most economical engine speed has been found to be 2,150 revolutions per minute.

The engines are so placed that the frontal area is reduced to approximately that of one engine. With one engine out of commission, the airplane can carry enough gasoline to cruise more than 2,000 miles on the other engine. Both engines are accessible in flight.

The airplane cruises on either engine alone at approximately 115 miles an hour. The speed at two-thirds throttle on both motors is approximately 130 miles an hour. The top speed with both engines at full throttle is approximately 160 miles an hour. This top speed was recorded over a measured course while the plane carried a useful load of 7,500 pounds.

The internal arrangement of the revised Bellanca Tandem, or *Blue Streak,* as it is also called, built for the Chicago *Daily News* on its order for a long-distance airplane with large load capacity, is different from what the internal arrangement of later models will be. Since the *Blue Streak,* named for the principal market and sporting edition of the Chicago *Daily News,* was designed especially for sustained flight, all of the space within the fuselage, except that necessary for the crew of four men and their supplies and equipment, is taken up with gasoline tanks.

Empty, the airplane weighs approximately 8,000 pounds. The total weight with crew, parachutes, radio equipment, 60 gallons of oil, 30 gallons of reserve oil, and 2,050 gallons of ethylized gasoline, is approximately 24,000 pounds. In addition, 150 gallons ot gasoline to be stored in five-gallon cans, food and water for the crew, additional water for radiators, and camera equipment may bring the total weight of the ship to 25,000 pounds.

The wing loading, when the total weight is 25,000 pounds, is 27.4 pounds per square foot. With the same load, and the engines throttled to deliver a total of 1,300 horsepower, the power loading is 19.2 pounds per horsepower.

With the adoption of water cooling, several radiation problems had to be solved. The result of the research was the installation of a nose-type radiator, divided vertically in the center, the right side serving the rear engine; the left, the forward engine. For the experimental flights following the installation of the water-cooled engines, an auxiliary radiator was installed under and between the two engines to give added radiation for the aft engine. The auxiliary radiator was not found essential to successful operation, however, and was therefore removed. The added saving of weight amounted to 50 pounds. The front engine has a water capacity in its cooling system of 16 gallons; whereas the rear engine, because of the greater carry of the feed pipes, takes 17 gallons. Emergency radiator water supply is carried in a five-gallon square aluminum tank. The water can be pumped into the radiators by a wabble pump through an ingenious three-way valve connected with the overflow tube from the radiator expansion tank.

A Curtiss honeycombed oil temperature radiator sends oil through the tubes; and water, in the circuit of the general engine cooling system, passes on the outside of the tubes. A 60-gallon oil tank is placed directly under the seats of the pilot and co-pilot. It is fitted with cooling tubes to regulate the oil temperature and intake and outlet air scoops to provide air circulation through the tubes. Behind and below this oil tank is located a 1,300-gallon gasoline tank made of heavy welded aluminum sheets, with bulkheads to prevent gasoline from swashing. Both oil and gasoline tanks are divided vertically into two parts, the left tank feeding the forward engine; the right tank, the rear engine. Gas may be pumped by a wabble hand pump from either tank to the other. Below these main tanks in the bottom of the fuselage are two dump valves, ten inches in diameter. They are controlled by cranks in the after cabin. The two valves permit almost instantaneous release of more than half the total gasoline load in the event of trouble on a full load takeoff. The tanks may be dumped together or independently. The tanks may be closed to provide buoyancy in the event of a forced landing upon water. The 1,300-gallon fuel tank has a hole through the center to accommodate the rear propeller drive shaft. Below the level of the shaft and extending to the rear of the fuselage are located two additional fuel tanks, the forward one having a capacity of about 230 gallons; the rear one, located aft of the radio transmitting and receiving apparatus, holds 100 gallons. Above this rear tank and behind the radio operator, mechanic and the radio apparatus, is space for 200 gallons of oil, water and gasoline to be carried in cans. The two wing tanks, of 235 gallons each, bring the total fuel carried to about 2,150 gallons.

The engines are located in the nose of the ship. Directly below the co-pilot's position a circular opening in the fire wall is provided with a zipper device which permits examination and minor repairs to the engines in flight. All fuel, oil and water connections may be inspected and most minor engine repairs performed in flight.

The rear engine drives a three-bladed metal propeller, nine feet in diameter. The forward engine drives a two-bladed wooden propeller, thirteen feet in diameter, which has two little blades at right angles to the larger blades, which drive additional cooling air into the radiator. Looking from the cockpit, the forward propeller revolves in a counter-clockwise direction; the rear propeller revolves in the opposite direction. The four-inch drive shaft of the rear propeller is in two parts, joined by a special coupling installed in self-aligning S.K.F.

(Continued on following page)

AIR-PORT Developments are *Superior* in . . LOS ANGELES COUNTY!

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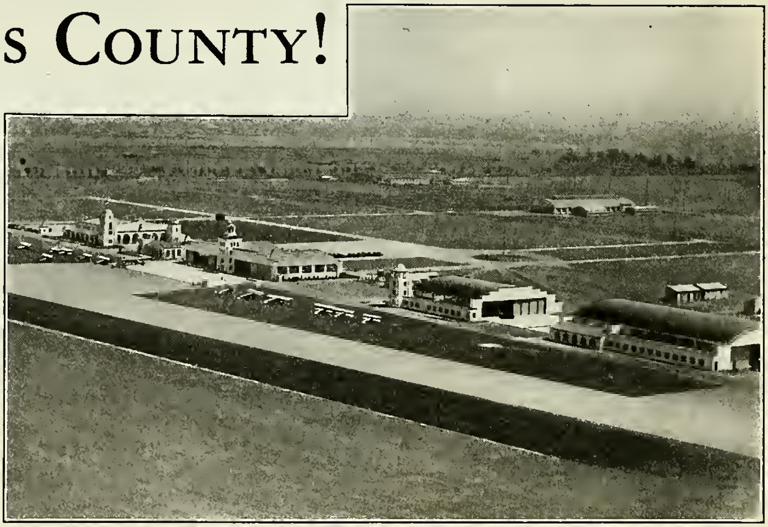
Wm. G. McADOO
Former Secretary of U. S. Treasury, now residing in Southern California.



Los Angeles Municipal Airport, Col. R. B. Barnitz, Director

"PROMINENT among the outstanding airport developments in this county are the municipal projects of Los Angeles, Long Beach and Santa Monica. These offer unexcelled facilities for schools, transport line terminals, factories, distributing agencies and the various activities incident to the aviation industry. They have developed into the most interesting and commanding aviation centers in the country. Practically every type of aeronautical operation is now represented at these fields.

"The exceptional progress of aviation in Los Angeles County, and its demonstrated potentialities, are due, in great measure, to the enthusiastic co-operation of the municipal governments, of civic organizations, and the air-minded public. Aviation has no better support anywhere than in Los Angeles County.

"The success of these municipal and the 40 odd other airports and landing fields in Los Angeles County is assured by the ideal flying conditions which prevail the year 'round in Southern California."

W G McAdoo

Aviation activity and aircraft manufacture in Los Angeles County are favored by all-year working and flying climate ...low wind velocity...cheap power and gas.. low building costs... adequate supply of skilled mechanics and licensed pilots.

Complete detailed surveys and information supplied on request by Industrial Department, Los Angeles Chamber of Commerce.

Santa Monica Airport, Lt. Duff Willson, Manager

Long Beach Municipal Airport, W. J. Putnam, Supt.

LOS ANGELES COUNTY

Flying All-Year

bearings, lubricated by separate force feeds in a Zerk system. The drive shaft is housed in a duralumin cowling, where it passes through the cabin.

The engine mount is of conventional truss type semi-cantilever construction. It is constructed of heavy gauge steel tubing, and is attached to the fuselage by similar tubing.

The duralumin cowling is constructed in ten units, any unit being detachable without disturbing the rest of the cowling. The aluminum cowling is fitted so that the engines are easily accessible. The cowling, which folds upward similar to the hood on an automobile, at the front follows the contour of the nose radiator, increasing in cross-sectional area until at the rear it conforms with the front of the fuselage.

In tests of the water-cooled engines so far conducted, the temperature has not risen above 200 degrees Fahrenheit. The oil temperature has never climbed to within ten degrees of the water temperature. Oil pressure runs from 100 to 120 pounds per square inch; fuel pressure is from three to six pounds per square inch.

The dimensions of the fuselage are 25 feet in length and ten feet six inches in height with a propeller in the nose and another in the rear.

The fuselage, the length of which constitutes slightly more than one-third of the overall length of the airplane, is streamlined to a sharp vertical edge at the rear.

The fuselage is constructed of six longerons over which is built a wooden frame. It is covered with linen fabric, except for that part back of the rear cabin seats. That section aft of the rear cabin has a covering of plywood to reduce vibration set up by the vacuum created by the rear propeller. Communication between the cockpit and the after cabin is over the gasoline tank, through a space approximately six feet long, 18 inches high and a little less than four feet wide. Provision is made for the storing of food, drinking water and supplies. This passageway is equipped with two hatches, one above the pilot's cockpit and the other above the radio operator's cabin, providing means for navigation observations and departure from the airplane.

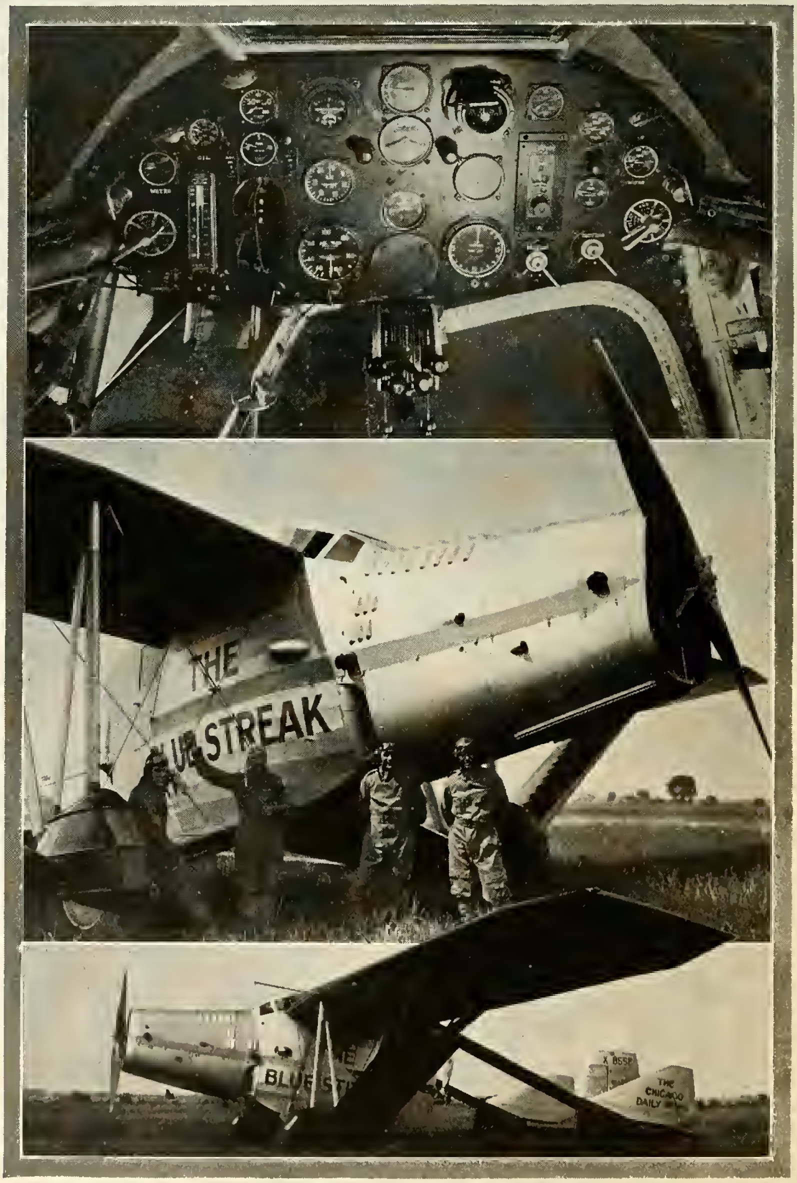
Although somewhat modified, the wing bracing bears a strong resemblance to that of the previous large Bellanca airplanes. The bracing is of the two-bay type, with the inner bay somewhat similar to a conventional monoplane with negative dihedral in the lower stub wing and positive dihedral in the upper wing. The outer bay resembles a braced monoplane, except that the supporting strut is of the usual Bellanca type, having a lift section and forming a wing with fore and aft struts. Unlike the *Roma,* this wing, which is called the auxiliary wing, is of constant chord and thickness.

The outer upper panel is of conventional construction, employing the usual Bellanca airfoil. Routed wood spars, wood ribs and fabric covering, finished in the usual manner, are used. The wing is exceptionally deep, affording a double drag truss making for a rigid wing. Ailerons extend through the entire span of the outer upper panels. The same type construction is used in the auxiliary wing. It does not, however, extend the entire distance to the upper wing. The spars continue to the upper wing spars, acting as struts. Because of the fact that the spar spacing of the auxiliary wing is considerably less than that of the upper wing, it is necessary for the spars of the auxiliary wings to diverge in order to reach the upper wing attachment points. The bent portions of these spars are made of birch laminations, by a special process developed by the Bellanca company. The spars are continuous throughout the bend and have sufficient rigidity to withstand bending loads.

The inner bay of the wing forms the landing gear truss. The wheels are housed partly within the wing structure and are faired into it. The front spar of the auxiliary wing is pinned to the other end of the axle, which is mounted rigidly to the front spar of the lower wing of the inner bay. Direct landing loads are carried through the N-strut to the upper wing and by heavy tie rods attached to the fuselage. The lower wing of this inner bay is tapered both in plan form and thickness in such a manner that the spars are of constant depth and section throughout. The upper wing of the inner bay has the same airfoil section as the outer bay upper wing.

The tail surfaces are supported by four outriggers which are attached to the wings at the N-struts. These outriggers are parallel in plan view. In side view the lower outriggers are parallel to the ground, while the upper is joined to the lower at a point below the stabilizer. The outriggers are of the hollow box type. The lower outriggers are faired with balsa wood; and the

(*Continued on following page*)



The 1350-horse-power Bellanca Tandem Sesquiplane "Blue Streak" and its crew

(Continued from preceding page)

upper are streamlined with ribs and covered with plywood. The outriggers are so shaped that, in flying position, a section parallel to the thrust is an efficient streamline form. The outriggers are braced laterally by two heavy diagonal cables in the plane of the lower two outriggers.

Two tail skids, each fitted with an oleo shock absorber, are attached to the rear end of the outriggers.

Vertical and horizontal tail surfaces are of wood construction similar to that employed in the main wings.

A single fin and rudder, mounted in the center of the stabilizer, has an overhang balance similar to that of the elevator. Two additional fins are provided, one in the plane of each outrigger, for the purpose of increasing the directional stability.

The horizontal tail surfaces have a high aspect ratio, since their span is greater than that of the inner bay of the main wing. The area of this horizontal tail is as large as the total wing area of the average light airplane. Streamline tie rods are used to support the fin to the stabilizer.

The pilot's cockpit is situated in the upper forward part of the fuselage, just behind and above the rear engine. This location gives good visibility both forward and downward. Entrance is gained by means of a door high up in the structure on the right-hand side. The door is reached by two steps built into the side of the fuselage and one on the leading edge of the lower wing. Controls consist of a single wheel, on the left-hand side of the cockpit. Rudder pedals are of the stirrup type, with toe type brake levers. Engine controls are located on the right-hand side of the pilot, forward and beneath the instrument board.

Two earth inductor compass indicators are used. The controller and one indicator are located on the radio operator's board, and the other indicator on the pilot's instrument board. A specially designed instrument board having a layout devised by Pilot Shirley S. Short is mounted vertically in the control compartment. Much of the instrument equipment was built especially for this installation by the Pioneer Instrument Company. It is complete and includes practically all devices required for blind flying.

The performance figures listed below are from actual flight tests with a total load of 15,500 pounds.

Specifications

Span .... 83.2 feet
Chord .... 9 feet
Overall length .... 47 feet, 3 inches
Overall height ....13 feet
Total wing area .... 912 square feet
Fuselage length ....25 feet
Fuselage height .... 10 feet, 4 inches
Span, horizontal tail plane .... 25 ft. 7 in.
Weight empty .... 8,000 pounds
Gasoline capacity .... 2,150 gallons

Performances

High speed on both engines.. 160 m. p. h.
High speed on rear engine ...... 114 m. p. h.
High speed on forward engine .. 116 m. p. h.
Landing speed .... 70-80 miles per hour
Cruising radius .... 5,000 miles
Take-off time .... 11 seconds

THE "SKYSPORT" GLIDER

THE "Skysport" is a secondary high-wing monoplane training glider developed by the Braley Glider Corporation of Wichita, Kan. Test flights of this ship have been conducted over flat territory in the vicinity of Wichita and satisfactory results have been obtained, according to officials of the company. The Skysport has a weight empty of 156 pounds, a gliding angle of twenty to one and a landing speed of twenty miles per hour.

The glider is streamlined and is provided with a specially modified high lift airfoil. The wings are built of spruce and birch plywood box spars, spruce and mahogany plywood ribs, and are covered with fabric. The fuselage is constructed of welded steel tubing.

Standard equipment includes a special launching hook for shock cord and tow line; pilot's seat; safety belt; a landing gear with two wire wheels, each thirteen inches by three inches, provided with Goodyear tires and tubes; and a spring tail skid.

Specifications

Span .... 37 feet 4 inches
Height overall .... 6 feet 6 inches
Length overall .... 21 feet 2 inches
Chord .... 5 feet
Aspect ratio .... 7 to 1

Areas

Wing area, including ailerons 170 square feet
Rudder area .... 6 square feet
Fin area .... 3 square feet
Stabilizer area .... 10 square feet
Elevator area .... 12 square feet
Wing loading ... 1.9 pounds per square foot

HEATER FOR ENGINE OIL

AS an addition to its line of airport accessories, the General Electric Company has announced a single-heat portable immersion heater, designated Y-2839, for warming engine oil preparatory to starting. The new unit is rated 750 watts and operates on 110-volt circuits, either alternating or direct current. Thus it may be used on the local electric lighting circuit in the hangar. It consists of a heating element twisted into the form of helix so that the effective heating length is only about ten inches. This permits its use in oil tanks where larger heaters cannot be inserted.

A 35-foot length of lacquered-braid cord is part of the equipment, together with an attaching plug and metal guard ring.

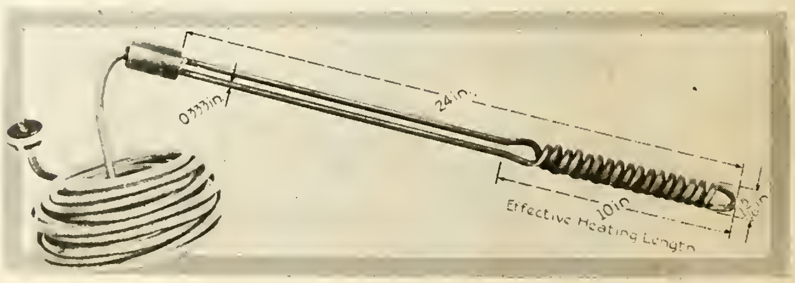
LENERT BIPLANE

THE Lenert Model C is an all-metal two-place biplane developed by the Lenert Aircraft Company of Penwater, Mich. This ship is powered with a Continental Model 70-A engine of 165 horsepower and is fitted with a Standard steel propeller. The stabilizer is adjustable from the pilot's seat, and aileron control is geared, no pulleys being utilized in the control system.

The fuselage has a margin of safety of 70 plus, according to the company, and the wings have successfully withstood a 20,000-pound sand test. The gasoline tank has a capacity of 51 gallons, and the oil capacity is six gallons. Landing gear is provided with brakes and the wheels are thirty inches by five inches. Standard equipment includes a Heywood starter, electric lights and an instrument board equipped with a complete set of flight instruments.

Specifications

Wing area .... 295 square feet
Weight empty .... 1,275 pounds
Weight loaded .... 2,250 pounds
High speed .... 125 miles per hour
Landing speed .... 35 miles per hour
Cruising radius .... 600 miles
Take-off distance .... 100 feet



General Electric portable immersion heater for warming engine oil

For eye  value

You want permanence of color and durability of finish

Whatever you may personally think of lavender bath tubs, black and pearl fountain pens, four-color-tone automobiles, and red enamel furnaces, bear in mind that they *sell*, and in greater quantity than they ever sold before. The same principle is applying in increasingly greater importance to the sale of airplanes. Eye-value is the thing the customer sees, the thing that advertises your ship wherever it goes.

Murphy Aircraft Pigmented Finishing Dope gives you the greatest purity of color because the colors are ground to microscopic fineness instead of merely being rolled. The exceptional durability of the vehicle is a further guarantee of the permanence of the brilliantly true color.

Murphy Aircraft Pigmented Finishing Dope is dope, which, though non-tautening in itself, does not decrease the tautness of previous coats of regular tautening dope. In fact it stabilizes the finish so that an ideal condition of tautness and flexibility is maintained.

Give your ships a finish worthy of their performance, and even more important from your point of view, a finish that will sing your praises for the longest possible period of time wherever your ships may go.

If you want more information or a demonstration on Murphy Aircraft Pigmented Finishing Dope, kindly write us.

MURPHY VARNISH COMPANY
Newark Chicago San Francisco
ESSEX VARNISH COMPANY, (Associated Company), NEWARK
Baking Material Specialists

Murphy Aircraft Pigmented Finishing Dope

MURPHY AIRCRAFT FINISHES

Aircraft Spraying Lacquer Colored
Aircraft Super Spar Varnish

"Z-1" Dural Primer Enamel
Heat Resisting Aluminum Mixing

Aircraft Flexible Finishing Lacquer Clear
Aircraft Non-Toxic Nitrate Dope

RECENT AIRCRAFT PATENTS

THE following patents of interest to readers of AERO DIGEST were recently issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C., at the rate of 20 cents each. State number of patent and inventor's name when ordering.

Parachute-rack. Edward L. Hoffman, Dayton, Ohio. (1,774,513)

Aircraft. Holden C. Richardson (captain, construction corps, U. S. Navy, retired), Washington, D. C. (1,774,526)

Aerial bomb or flare. Samuel Wiley, Metuchen, N. J. (1,774,535)

Aeroplane control. Otto A. Schaer, Lusanne, Switzerland. (1,774,568)

Airplane. Charles H. Day, Ridgewood, and Rostislaw Komarnitsky, Paterson, N. J.; assignors to New Standard Aircraft Corporation, Paterson. (1,774,593)

Landing and launching ways. Byron C. Riblet, Spokane, Wash. (1,774,670)

Aircraft. George B. Starkweather, Washington, D. C. (1,774,677)

Bomb-sight. Albert T. Ford, Arthur S. Halsey, and Samuel B. McMurrain, Washington, D. C. (1,774,704)

Airplane construction. Chauncey L. Rockwell, Chicago, Ill. (1,774,726)

Power plant for aircraft and control thereof. Chance M. Vought, Grenwolde, Great Neck, N. Y. (1,774,738)

Parachute-opener. Axel Nelson, Bristol, Pa. (1,774,811)

Aeroplane braking system. Ralph W. Hilton, Wichita, Kans. (1,775,039)

Airship. John M. Boscardin, Canaan, Conn. (1,775,062)

Wind-direction signaling device for aircraft-landing fields. Paul N. C. James, Paris, France. (1,775,104)

Airplane-propeller. Constant Ottevaere, Spokane, Wash. (1,775,138)

Air navigating machine. Joseph A. La Bille, Chicago, Ill. (1,775,284)

Aircraft supporting and controlling surface. Joseph Blondin, Los Angeles, Calif. (1,775,386)

Wing-bracing structure. Roland Chilton, Keyport, N. J.; assignor to Uppercu-Burnelli Corp. (1,775,513)

Aeroplane. Charlie T. Jones, Poplar Bluff, Mo. (1,775,559)

Position-finder (for aircraft-propellers). John B. Kneip, Seattle, Wash. (1,775,563)

Propeller. Stefan Piesik, Mount Union, Pa. (1,775,568)

Landing device for aircraft. Max Boucher and Raoul Bernady, Neuilly-sur-Seine, France. (1,775,583)

Traffic airship of the rigid type. Josef Schulz, Berlin, Germany. (1,775,604)

Warning signal. Lewis McSpaden, New York, N. Y.; assignor to Fairchild Aerial Camera Corporation, New York. (1,775,731)

Propulsion of bodies. Frazer W. Gay, Newark, N. J. (1,775,757)

Single-screw rapid helicopter. Edouard A. Perrin, Le Vesinet, France. (1,775,783)

Flying-machine. George Lehberger, Union Township, N. J. (1,775,861)

Aircraft-engine. Marius J-B. Barbarou, Paris, France. (1,775,926)

Aircraft. Albert P. Thurston, London, England. (1,775,977)

Airport. John S. Donaldson, New York, N. Y.; assignor to Airport Lighting, Inc., New York. (1,776,111)

Airplane. Howard G. Williams, Canton, Ohio. (1,776,139)

Aeroplane. Martin Horeth, Brooklyn, N. Y. (1,776,316)

Float construction for hydroplanes. Adolf Rohrbach, Berlin-Wilmersdorf, Germany. (1,776,336)

Combination land and air machine. Andrean G. Ronning, Minneapolis, Minn. (1,776,374)

Aeroplane control. Rolland D. Wesley, Norton, Kans. (1,776,378)

Floating terminal for aircraft. Hugo Sundstedt, New York, N. Y.; assignor to American Avigation Corporation, New York. (1,776,453)

Airship landing and mooring mast. Ivan N. Kinney, San Diego, Calif. (1,776,511)

Parachute. Charles H. Kugler, Lexington, Neb. (1,776,629)

Propeller. Sidney T. Carter. Parnassus, Pa. (1,776,650)

Fin system for hydro-aeroplanes and/or water aircraft. Giovanni Pegna, Genoa, Italy. (1,776,700)

Combined brake and auxiliary wing mechanism for aeroplanes. Clement B. Kasuboski, Clintonville, Wis. (1,776,733)

Shock-absorber (for aircraft). William T. Fox, Rochester, N. Y. (1,776,766)

Landing-gear for aircraft. Burke D. Adams, St. Louis, Mo. (1,776,768)

Flare-supporting bracket for aircraft. Harold E. S. Holt, London, England. (1,776,810)

Navigation of aircraft. Hugo Junkers, Dessau, Germany. (1,776,811)

Airplane flotation system. Frank M. Salisbury, Dundalk, Md.; assignor to Glenn L. Martin Co., Baltimore, Md. (1,776,865)

Fuel control and balancing system (in aircraft). Joseph G. Yonkese, Brooklyn, N. Y. (1,776,877)

Undercarriage for aircraft. Robert B. C. Noorduyn, Hasbrouck Heights, N. J.; assignor to General Aviation Corporation, New York, N. Y. (1,776,926)

Reversible airplane propeller. Alex Petrow, San Francisco, Calif. (1,776,980)

Flying-machine. Richard H. Chattin, Whittier, Calif. (1,776,994)

Airplane. Hervey M. Salisbury, Walnut Grove, and Arthur E. Miller, Sacramento, Calif. (1,777,018)

Storage and conveying mechanism for aircraft. Charles S. Hall, Oakland, Calif.; assignor to Hall Engineering and Aircraft Construction Co. (1,777,083)

Apparatus for launching aircraft. William A. D. Forbes, Coulsdon, England. (1,777,167)

Parachute aircraft flare. Samuel D. Wiley, Metuchen, N. J. (1,777,188)

Amphibian aircraft. Albert E. & Hugh O. Short, Rochester, England. (1,777,232)

Brake for flying-machines. Arthur Connors, Brooklyn, N. Y. (1,777,254)

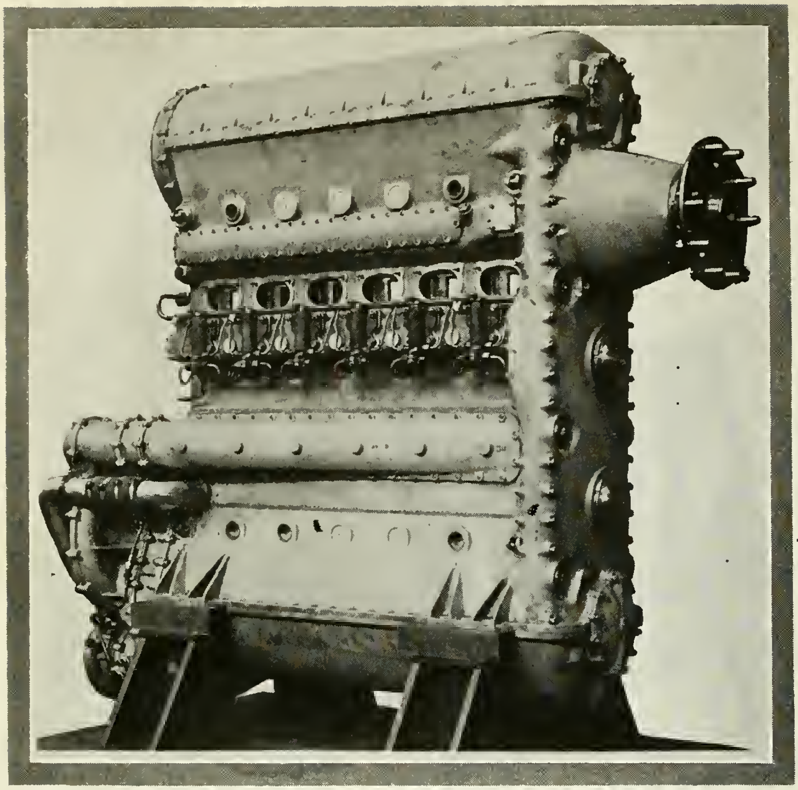
SPECIFICATIONS OF FORD TRIMOTOR AIRPLANES

Model	4-AT-E	5-AT-C	5-AT-C-S	6-AT-S	7-AT
Type	Landplane	Landplane	Seaplane	Seaplane	Landplane
Gross weight	10,130 lbs.	13,500	13,500	12,500	12,910
Weight empty (passenger service)	6,500 lbs.	7,600	9,100**	8,250	7,280
Disposable load	3,630 lbs.	5,900	4,400	4,250	5,630
Payload	1,725 lbs.	3,643	2,143	2,344	3,380
Maximum speed	132 m.p.h.	152.5	130	120	134
Cruising speed at 1,700 r.p.m.	107 m.p.h.	122	104	100	110
Stalling speed	57 m.p.h.	64	64	61.5	60
Radius of action (Std. fuel cap.)	570 miles	560	490	535	615
Rate of climb at sea level	920 ft. min.*	1,050*	900	650	880*
Climb from sea level in 10 min.	7,200 feet*	8,000*	6,800	5,000	6,800*
Service ceiling, 3 motors	16,500 feet*	18,500*	14,200	11,000	14,100*
Absolute ceiling, 3 motors	18,600 feet*	20,500*	16,100	....	16,000*
Wing span	74 feet	77′ 10″	77′ 10″	77′ 10″	77′ 10″
Overall length	49 feet 10 inches	50′ 3″	51′ 4″	50′ 6″	50′ 3″
Overall height	11 feet 9 inches	12′ 0″	14′ 6″	14′ 1″	12′ 0″
Wheel tread	16 feet 9 inches	18′ 7″	14′ 9″	14′ 4″	18′ 7″
Cabin width, average	4 feet 6 inches	4′ 6″	4′ 6″	4′ 6″	4′ 6″
Cabin height, average	6 feet	6′ 0″	6′ 0″	6′ 0″	6′ 0″
Cabin length	16 feet 3 inches	18′ 9″	18′ 9″	18′ 9″	18′ 9″
Cabin volume	461 cubic feet	529	529	529	529
Wing area	785 square fect	835	835	835	835
Number of seats (removable)	11	13-15	13	12	13
Baggage space	30 cubic feet	30	30	30	30
Gasoline capacity (standard)	231 gallons	277-355	277	231	281
Oil capacity	24 gallons	34	34	24	30
Engines	J-6 or Wasp, Jr.	Wasp	Wasp	J-6 or Wasp Jr.	J-6 or Wasp
Total power	900 horsepower	1,260 hp.	1,260 hp.	900 hp.	1,020 hp.

*Corrected to standard atmosphere

**Includes—Electric starters; generator; landing lights; seaplane rudder; steel ladder; anchor, cable and winch; and special seaplane protective coating

No. 742 — Portable Case



JUNKERS DIESEL ENGINE

SUPPLEMENTING the description of the Junkers Diesel engine published in the January issue of AERO DIGEST, an additional photograph and data of this oil engine have been made available through our correspondent in Germany, Mr. Edwin P. A. Heinze.

The Junkers Diesel airplane engine has six cylinders. There are two opposed pistons in each cylinder and two crankshafts, one above, and the other below, as shown in the accompanying photographs. The crankshafts are connected by a train of five gears at the front end, the second gear from the top driving the propeller. The engine works on the two-stroke principle and has ports instead of valves. The upper pistons open and close the air inlet ports, and the lower pistons close the exhaust ports. Each piston has a stroke of 210 mm. (8.2 inches), and the bore of the cylinder liners is 120 mm. (4.7 inches). The compression ratio is 14 to 1, and the normal output at present is 600 horsepower. Each cylinder has two pumps and two nozzles arranged on opposite sides.

The cylinders are fitted in one block of silium, a metal composed of aluminum and silicon, together with the driving gears. This block is of slender shape, has a high power of resistance and is light in weight.

The fuel pumps, which are located at both sides of the cylinders, each supply two spray nozzles, and are operated by two cam shafts having bearings about half way up the cylinders and operating off one of the wheels of the driving gear. All pumps on one side of the cylinders can be regulated from the pilot's seat by means of a single rod.

One of these Diesel engines is used to power a new Junkers passenger monoplane for flights on which experimental data is being obtained.

INJECTION VALVE FOR OIL ENGINES

THE injection valve described in N.A.C.A. Report 341, by William F. Joachim, Chester W. Hicks and Hampton H. Foster, was designed and developed at the Langley Memorial Aeronautical Laboratory of the National Advisory Committee for Aeronautics in connection with a general research on aircraft oil engines. The purpose of this investigation was to provide an automatic injection valve of simple construction which would produce a finely atomized oil spray of broad cone angle and would fulfill the requirements of fuel injection in aircraft oil engines. The injection valve designed has only six parts; i. e., two concentric nozzle tubes flared at one end, two body parts, and two nuts. The nozzle tubes are provided with seats at the flared ends to form an annular orifice which automatically varies in area with the injection pressure. Adjustment of the nuts determines the valve-opening pressure. The fuel passage to the orifice is provided by the clearance space between the nozzle tubes. When sufficient oil pressure is developed by the fuel pump, the flared ends of the nozzle tubes move apart slightly, and the oil passes through the annular orifice, producing a broad conical spray. The nozzle tubes are so constructed as to cause the cylinder gases to heat them approximately 500 degrees Fahrenheit, which preheats the oil and tends to reduce the ignition lag.

The results of tests made with the N.A.C.A. spray photography equipment on this injection valve indicate the effect of several factors on spray penetration. For a duration of injection of 0.003 second, and a valve-opening pressure of 2,500 pounds per square inch, a change of injection pressure from 6,000 to 10,000 pounds per square inch increased the penetration twenty-five per cent. For a constant speed and fuel quantity per cycle, a change of valve-opening pressure from 2,000 to 5,000 pounds per square inch, which caused a corresponding change in maximum injection pressure from 6,700 to 10,500 pounds per square inch, increased the penetration five per cent. A change of spray-chamber air density corresponding to a change of compression ratio of from 11.2 to 15.3 decreased the spray penetration eight per cent. Curves are presented showing these effects, together with the effect of engine-operating temperature of the valve-opening pressure.

Analysis and engine tests indicate that the fuel spray from this type of injection valve has characteristics which reduce the time lag of auto ignition and promote efficient combustion in high-speed oil engines.

Report 341 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

DESIGN OF PLYWOOD WEBS

REPORT 344 by George W. Trayer of the Forest Products Laboratory deals with the design of plywood webs for wooden box beams to obtain maximum strength per unit weight. A method of arriving at the most efficient and economical web thickness is presented and working stresses in shear for various types of webs and species of plywood are given.

Report 344 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

NEW GODELL-PRATT DRILL

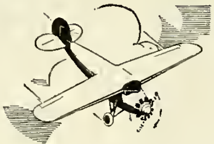
THE Goddell-Pratt Company has recently introduced a new one-quarter inch light weight drill. The drill is driven by a Westinghouse motor capable of driving the chuck spindle at a no load speed of 1,700 r.p.m. The full load speed is 850 r.p.m. The double speed reduction is accomplished through a chain of wide faced gears made of special alloy steel, carefully heat treated. The drill has a full ball bearing spindle. Two sets of ball bearings are provided to take care of both the thrust and radial loads.

The castings and pistol grip are ribbed to provide a firm grip for the operator. The weight is four pounds three ounces. The length overall is 11.75 inches. Twelve feet of rubber covered cable and a rubber plug are furnished with each drill.

Rigged

to Go Like the Wind

But its safety depends largely on sensitive ears, eyes, and nose



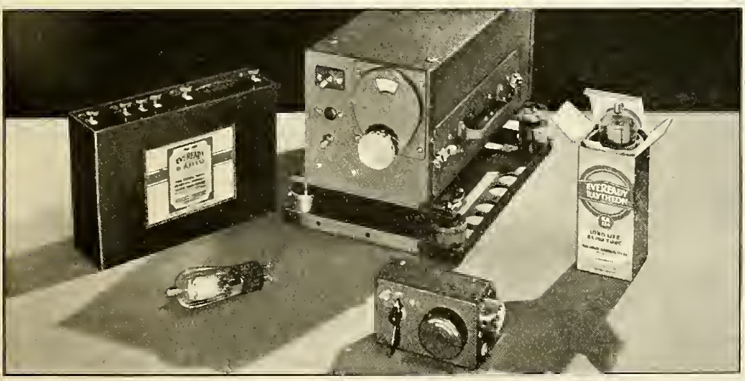
RADIO is to the airplane what hearing, sight and smell are to the deer. It warns against fog or storms that wait in ambush, and advises landing or detour. It lays down a beacon path which wind can't scatter nor clouds impede.

Aircraft Radio Corporation engineers have led the search for "eyes" and "ears" a hundred times more capable than man's and for instruments that would insure unfailing good judgment. They were first to develop radio beacon receiving equipment and shielding for standard spark plugs.

When a built-on antenna became imperative, A. R. C. engineers made it practical by designing a receiving set many times more sensitive than ever before, smaller in size, and with a range of 200 miles or more. This popular receiver, manufactured under A. R. C. licenses by Stromberg-Carlson, is powered by Eveready "B" Batteries and Eveready Raytheon 4-Pillar Tubes.

Research, through a competent engineering staff and modern field and flying laboratories, is the fundamental purpose of Aircraft Radio Corporation. It licenses manufacturers of highest standing to produce equipment it designs. It offers unexcelled service to commercial and governmental agencies who are contributing to the progress of air transportation. Write for interesting booklet and ask to be kept posted on newest developments.

A. R. C. is the designer, sales representative and installation agent for all Aircraft Radio Equipment manufactured by Stromberg-Carlson Telephone Mfg. Co., and National Carbon Company, Inc. Inquiries are invited, or, pay a flying visit to A. R. C. airport, three miles north of Boonton, New Jersey.



AIRCRAFT RADIO CORPORATION

SUBSIDIARY OF RADIO FREQUENCY LABORATORIES, BOONTON, NEW JERSEY

DIGEST OF FOREIGN TECHNICAL ARTICLES RELATING TO AERONAUTICS

By Elsa Gardner

STABILITY OF TRAILING INSTRUMENTS

The Stability of a Body Towed by a Light Wire, H. Glauert. Aeronautical Research Committee—Reports and Memoranda No. 1312 (Ae. 451), February, 1930, 22 pp., 4 diagrams.

THE form assumed by a light wire used to tow a body behind an airplane at constant speed has been known for many years, and the corresponding form for heavy wire has been derived in Reports and Memoranda No. 554 by A. R. McLeod. No attempt, however, has been made to determine the stability of the body, a problem becoming more and more important because of the practice of towing aerodynamic instruments below the airplane.

In this report the stability of a body towed by light inextensible wire has been investigated on certain simplifying assumptions regarding the force experienced by the wire. In addition to the pitching and yawing oscillations of the body, there are three oscillations of the whole system. The most important oscillation is found to be associated with a bowing of the wire in the plane of symmetry. Even if the body has satisfactory statical stability, this oscillation aym become unstable if the body is too short.

CORROSION PREVENTION IN SEAPLANES

The Corrosion of Metals, H. Sutton. "Aircraft Engineering," Vol. 2, No. 18, August, 1930, pp. 209-210.

THE author reviews recent researches on light alloys and steels with applications to the construction of seaplanes. He discusses the heat treatment to which duralumin is subjected, and emphasizes how important its effect may be on the resistance of duralumin to intercrystalline corrosion. After dealing with some recently developed alloys with high resistance properties, he points out how the anodic process has a subsidiary value in revealing defects in materials. He concludes by surveying the position in regard to magnesium alloys and steels. The best paints and enamels for use on seaplanes are also referred to.

AIRCRAFT PERFORMANCE CHARTS

Charts for Aircraft Performance Reductions, H. L. Stevens, and A. E. W. Nutt. Aeronautical Research Committee—Reports and Memoranda No. 1316 (Ae. 453), April, 1930, 18 pages and 3 diagrams.

A SERIES of charts is presented by the use of which the performance of an aircraft under standard conditions can rapidly and accurately be obtained from the test observations. They show whether the observations should be reduced on the pressure, density or some intermediate basis, and enable the correct basis of reduction to be applied. If standard performance curves have been obtained for any particular aircraft, the use of the charts enables the effect of a change in the basis of reduction to be seen. They also cover the employment of either I. C. A. N. or isothermal altimeters.

The general principle of the method of reducing the observations and the manner in which the charts are used for establishing the basis of reduction and for applying it when found are described with the theoretical argument underlying the reduction method and derivation of the charts. Condensed tabular statements of the operations necessary to obtain any specific standard performance curve and a numerical example are included in the appendices.

WHEEL STRESSES

The Stresses in a Radially Spoked Wire Wheel Under Loads Applied to the Rim, A. J. S. Pippard and W. E. Francis. Aeronautical Research Committee—Reports and Memoranda No. 1302 (Ae. 445) February, 1930, 43 pp. 17 diagrams.

IN this theoretical and experimental analysis, the case considered is that of a wheel with radial spokes under the action of a radial load on the rim. Since the spokes have practically no flexural rigidity, they are assumed pinjointed both to the hub and to the rim.

By the method of strain energy analysis, a complete solution of the problem of stress distribution in a radially-spoked radially-loaded wire wheel is obtained. When the number of spokes exceeds six, however, this solution is not by itself of great practical value, but sufficient experimental work has been done to justify the use of approximate formulas based on a mathematical analysis of the case of a wheel having an infinite number of spokes.

MICROMANOMETER

A Micromanometer of High Sensitivity, E. Ower. Aeronautical Research Committee—Reports and Memoranda No. 1308 (Ae. 448), February, 1930, 7 pp. and 4 diagrams.

THE development of a manometer of sensitivity exceeding that of any convenient existing type, which was required for the extension to low wind speeds of the calibration of the National Physical Laboratory standard pitot-static tube, is discussed. Rough experiments indicated that a sensitivity of 0.00001 inch of water could be obtained with a null-reading instrument embodying the Chattock tilting cup principle and using the movement of a small air bubble in a horizontal capillary tube to indicate balance of pressure in the cups.

An instrument was constructed on these lines. Its behavior is entirely satisfactory with the precautions taken to insure steady temperature conditions and to avoid the necessity for more than normally good workmanship in mechanical construction. It shows pressure differences of 0.000005 inch of water, and is thus more than ten times as sensitive as a 13-inch Chattock gauge. With its aid a velocity head corresponding to a speed of 1.5 feet per second can be observed with an error not exceeding plus or minus one per cent on speed.

WING VIBRATION MEASUREMENTS

Deformation Measurements in Aircraft by Means of Photographic Optics (Optisch-photographische Formänderungsmessungen an Luftfahrzeugen), H. G. Kussner. "Zeitschrift für Flugtechnik und Motorluftschiffahrt," Vol. 21, No. 17, September 15, 1930, pp. 433-440, 30 figs.

IN ORDER to measure deformations in the wing truss structure of aircraft, rows of clearly photographed measuring points were recorded on a moving sensitive paper ribbon. By this means changes in deformations, especially vibrations, may be measured in operation free from inertia.

For application of these methods to airplanes in flight, an easily handled measuring camera, the Optograph, was developed in the Static Division of the Deutchen Versuchsanstalt für Luftfahrt. It permits several objectives to be lined up simultaneously in suitable positions. The paper ribbon moves on interchangeable rolls with constant, adjustable speed. For marking the measuring points, incandescent lamps or triple mirrors are employed. The report describes in detail the development, design and application of the Optograph and illustrates the measuring process with an example.

Report of Deutschen Versuchsanstalt für Luftfahrt.

GERMAN AERONAUTICAL RESEARCH

(1930 Yearbook of the German Research Institute for Aircraft, Berlin-Adlershof) Jahrbuch 1930 der Deutschen Versuchanstalt fur Luftfahrt, E. V. Berlin-Adlershof.

A RESUME of the work undertaken by the D.V.L. during the last of 1929 and first of 1930 precedes the detailed accounts of the individual investigations which deal with aerodynamics, statics, engines, materials, aerial navigation, radio and electricity, and flight testing. Some of these articles have already appeared in *Luftfartforschung* and have been abstracted in previous issues of AERO DIGEST.

Among the 57 researches described are: Elastic Effects, Elastic Hysterosis, and Temperature Compensation of Aneroid Boxes; Flight Tests to Indicate Static Longitudinal Stability; Longitudinal Stability of Airplanes with Free Elevators; Tests of a New Form of Tail Skid; Vibration Research on the Engine Installations of the airship *Graf Zeppelin;* Wire, Strands and Rope in Airplane Construction; Influence of Glue on the Efficiency of Airplane Plywood; Tests with Ultra-Short Waves in Air Transport; The Respiration of High Altitude Fliers.

SEAPLANE DESIGN

Seaplane Hulls and Floats, H. M. Garner. "Aircraft Engineering," Vol. 2, No. 18, August, 1930, pp. 193-196, 10 figs.

PRESENT knowledge of the design of hulls and floats for seaplanes is reviewed with suggestions for future research. Problems arising in the measurement of water resistance of seaplanes are discussed, and details are given of the apparatus developed by the German Government Experimental staff at Adlershof, and of the method em-

(Continued on following page)

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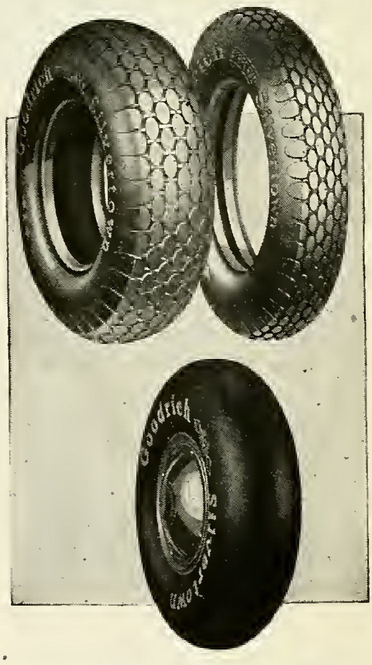

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(*Continued from preceding page*)

ployed at the M. A. E. E., Felixstowe. A means by which take-off tests at full load can be replaced to a first approximation by throttled tests at normal load is outlined.

Resistance curves for a number of different flying boats are shown, and on the same diagram are drawn sections of the hulls just in front of the main step. The increase in resistance over most of the range is attributed to the tendency to make hulls and floats more seaworthy by making the V of the hull deeper. The author claims that a reduction of at least 10 per cent in resistance as compared to the next best hull, if confirmed by full-scale tests, will cause a considerable reduction in time of take-off.

The Design of Seaplanes, A. Gouge. "Aircraft Engineering," Vol. 2, No. 18, August, 1930, pp. 202-206, 16 figs.

THE strength, stability and water and flying qualities of both types of seaplanes are discussed. The author thinks that, although the twin-hull plane has not yet received much attention in England, this type will probably be considered when the all up weight exceeds 50 tons, because then the problem of lateral stability on the water solves itself.

In regard to construction materials, the author considers it is only a matter of time before hulls will be completely manufactured in stainless steel. He outlines a method for constructing a twin-float seaplane and gives the results of model tests in the tank, as well as of air performance tests.

CRANKSHAFT FRACTURE CAUSES

Crankshaft Fractures and Material Research (Kurbelwellenbruche und Werkstoffragen), K. Matthaes. "Luftfahrtforschung," Vol. 8, No. 4, July 28, 1930, pp. 91-120, 67 figs.

RESULTS of an investigation into the causes of the fracture of the crankshafts employed in vertical aircraft engines are described in detail. From a large number of broken shafts examined, the fractures were found to be typical torsion vibration fractures, mostly spiral fractures, through the journal starting from the groove between the journal and the cheek, or from oil holes.

In order to determine the properties of the materials used, fourteen of the shafts were tested and their chemical composition, microstructure, and tensile properties were found. The tensile strength of the steels aomunted to 80 to 140 kilograms per square millimeter. On the smooth bar, the continuous resistance to bending proved to be 38 to 55 per cent of the static tensile strength, whereas test bars with sharp-edged cross-sectional grooves gave 45 to 55 per per cent smaller values. The resistance to torsional vibration was about 31 per cent of the static tensile strength. The damping capacity of the steel was small.

Grain size and strength are taken up, as well as grain structure, non-metallic inclusions, material defects and uniformity of hardening the steel. The influence of different ageing operations on the frequency of fracture and the effects of depth of hardness on the durability are determined.

A wider series of tests were carried out with regard to the influence of hardening on the continuous resistance, and it is shown that resistance to torsional vibration and to bending vibration increases with increase of strengthening up to the highest hardness value of the steel. The conclusions of a series of tests to determine the influence of crankshaft form on its continuous resistance are reported. The resistance of the smooth bars to torsional vibration amounted to nearly 37 kilograms per square millimeter, but transverse grooves and oil holes reduced the variable resistance from 36 to 40 per cent.

Report of Deutschen Versuchsanstalt für Luftfahrt.

The Equations of Motion of a Viscous Fluid in Tensor Notation, C. N. H. Lock. Aeronautical Research Committee—Reports and Memoranda No. 1290 (Ae. 439), April, 1929, 28 pp.

IN all physical problems of a general nature, and in hydrodynamics especially, a considerable simplification arises if the various "vector" quantities are represented by a single symbol instead of the three components of the vector in Cartesian coördinates. In the present report the various steps in the standard proof of the equations of viscous flow are translated intc tensor forms. The resulting equations apply to the most general possible system of coördinates in three dimensions in which the three coördinates are functions of the Cartesian coördinates. The coördinates are, therefore, in general, curvilinear and oblique. The tensor equations are here used to obtain the equation of viscous flow and expressions for the components of stress in general orthogonal curvilinear coördinates in ordinary notation. These can at once be reduced to the commonly useful forms of spherical polars and ellipsoidal coördinates. Finally, it is shown how the tensor equations can be used to deduce the equation of viscous flow in terms of Stoke's stream function for motion symmetrical about an axis in orthogonal coördinates.

DIESEL PUMPS

Tests of a Geared Pump (Prove su di una pompa ad ingranaggi), A. Castagna. "Aerotecnica," Vol. 10, No. 7-8, July and August, 1930, pp. 613-628, 10 figs.

THE author describes a special type of geared pump designed for circulating oil in a Diesel engine and outlines an investigation undertaken at the Royal School of Engineering at Turin. The results of the tests are given in a series of curves to set up the relation of the course of the fluid with the differences of pressure developed, with the angular velocity, and with the efficiency.

In order to measure the pressure, there is calculated at the base the coefficient of resistance to the motion of the fluid within a given iron pipe, either for the cut-off level surface or the uneven surface of the pipe.

Report of the Aeronautical and Mechanical Laboratories of the Royal School of Engineering at Turin.

WING STRUT INTERACTION

The Interaction of Struts in Mock-up Tests (L'Interaction des mats dans les essais de maquettes), R. Pris. "Aeronautique," Vol. 12, No. 136, September, 1930, pp. 333-338, 8 figs.

THE interaction of various forms of struts on biplanes and monoplanes is considered and the means for determining the drag of the struts (profile plus interaction), in order to deduct it from the total drag obtained in model tests, are discussed. In the case of oblique struts, the drag of one strut varies along with the incidence, but in tandem struts the drag could be found for only one position of the model.

In the case of a monoplane with extrados struts, the measurements given were confirmed by tests on the supports of elevated engine beds. These showed that there may exist a very important interaction proceeding from the connection of wing and struts, in functions of their form and of their relative positions. The author states that in this case it is necessary to be very careful in using rectangular struts. He thinks it preferable to reproduce the fairing of the struts as well and to apply the correction of passive drag suggested by Walter Diehl to the entire model.

The employment of such rectangular struts is recommended, on the contrary, in the case of biplanes, because they give more consistent measurements, and for intrados struts (as, for example, the connection of fuselages and engine beds with the wing).

Sections of rectangular struts, 6 by 20 millimeters and 9.5 by 20 millimeters were tested alone and in tandem and their drag determined.

The author is Director of the Laboratoire Eiffel.

GERMAN AERODYNAMICAL RESEARCH

Modern Aerodynamical Research in Germany. J. W. Maccoll. Royal Aeronautical Society "Journal," Vol. 34, No. 236, August, 1930, pp. 649-679, and (discussion) 679-689. Bibliography.

THE most important results of modern German research upon the motion of incompressible fluids are described. The first section deals with the theory of the boundary layer and its application for laminar and turbulent conditions. The investigations upon the origin of turbulence is taken up in the second part, and the author states that the researches being carried out at Göttingen at present should go a long way towards explaining the type of oscillatory motion set up in a fluid when the laminar flow in the boundary layer becomes unstable.

The third section is devoted to the development of the theory of the Mischungsweg, which has been of value in revealing something of the inner mechanism of turbulent flow.

AIRSHIP DESIGN

The Cross-Section of the Semi-Rigid Airship, F. G. Evans. Royal Aeronautical Society "Journal," Vol. 34, No. 236, August, 1930, pp. 690-722, 11 figs.

THE primary object of the paper is to put forward a graphical method of determining the shape of the cross-section of the airship and the loads in the envelope and rigging wires, in the plane of the cross-section, for different loading conditions. A brief review of other methods of dealing with the subject and the effect of different schemes of rigging on the "breathing" are included.

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All credit is due to the skill and courage of these intrepid flyers which have made them the outstanding pioneers of aviation. Yet on the American "Spirit of St. Louis" and the French "Question Mark" no chances were taken with equipment. Performance alone governed the selection of every part. And SKF Bearings were first choice, as they have been on every epoch-making flight. Is it any wonder that SKF are used throughout the world and by 65 manufacturers in the aviation industry in this country?

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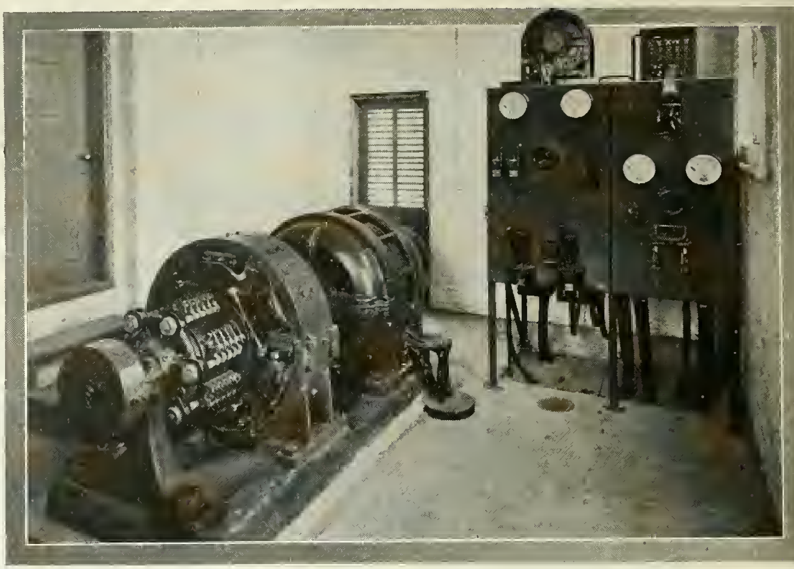
BERLINER-JOYCE WIND TUNNEL

A NEW commercially operated wind tunnel has been completed at the plant of the B/J Aircraft Corporation (formerly Berliner-Joyce) near the new municipal airport at Dundalk, Maryland. By means of this air tube, the engineers of the company will be able to calculate the performance and stability of all planes the company plans by measuring the forces and moments on exact scale models in the wind stream. The tunnel is electrified with General Electric equipment.

The tunnel is housed in a large brick building built especially for the purpose. A large four-bladed propeller 12 feet 6 inches in diameter, powered by an electric motor which develops 224 horsepower at 850 revolutions per minute, will send the air through the tunnel at a speed of 110 miles an hour. The tunnel consists of two cones, the entrance cone being 16 feet square at the mouth. It is constructed of poplar, and narrows down to a circular throat seven and a half feet in diameter.



General Electric motor of 224 horsepower in the B/J wind tunnel.

Just beyond this throat, the model to be tested is hung upside down on a very delicate balance, the plane being inverted so that its movements may be registered on the sensitive instruments by tension, thus eliminating the large rods which would have to be used were it hung right side up.

Above the experimental chamber in which the model is hung is the observation room, containing the balance and the measuring instruments. This room serves also as an office for part of the research staff. The air, after being drawn into the entrance cone and past the model, enters the expanding exit cone. At the end of this cone is the fan which sucks the air through the two cones.

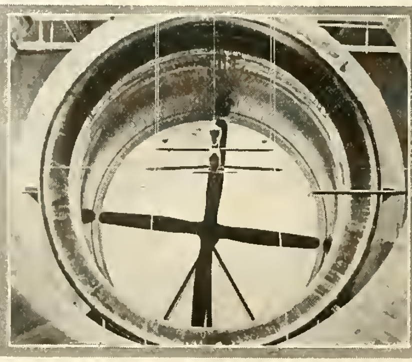
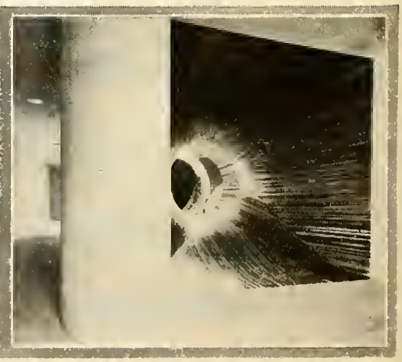
The balance on which the models are suspended is so sensitive that it is capable of measuring to 2/10,000-pound, six distinct aerodynamic components of the force exerted on the model by the air stream. These are the lift, drag, sideforce, pitching moment, rolling moment and yawing moment; all of which aid in determining the performance and stability of the finished product.

The building housing the tunnel has several unique features. After having been drawn through the tunnel by the fan, the air is divided and passes to the right and left down to larger passages to the other end of the structure, where the streams rejoin and re-enter the tunnel. The walls are curved to guide the flow of the air so that there is little interference with its passage, and are finished with smooth plaster to reduce the friction created by the wind.

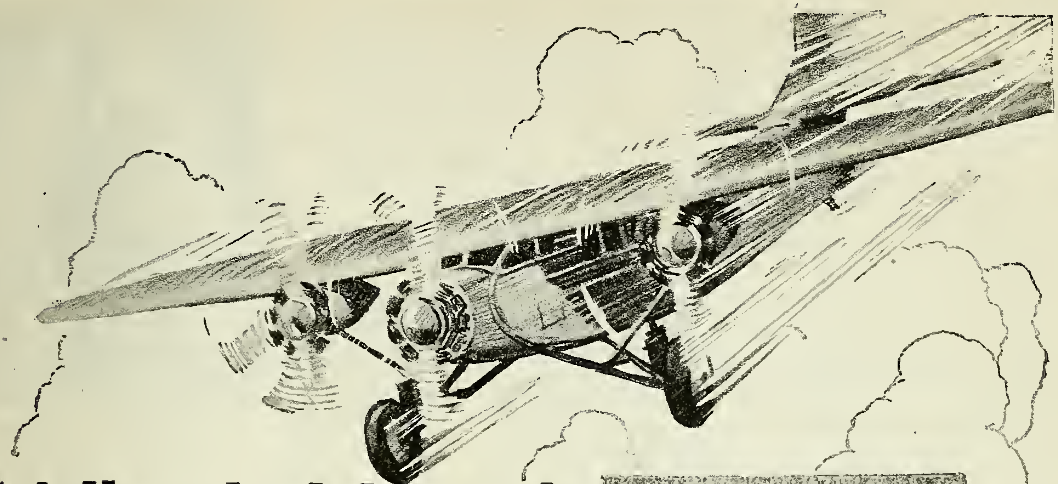
Electric equipment for the wind tunnel includes a motor-generator set, switchgear, and a direct-current motor for driving the wind tunnel propeller or fan. Ward Leonard control is provided to give the necessary motor speeds to permit of a wide range of air velocities in the tunnel. The Ward Leonard system gives accurate control over the speed range. The motor-generator set consists of a 6-pole, 150-kilowatt, 1,200-revolution per minute, separately excited generator; a synchronous type motor, rated 225 kilowatts, 220 volts, 3 phases, 60-cycles, 1,200 revolutions per minute; and an exciter, direct connected, rated 6 kilowatts, 250 volts, compound wound. This is complete with field rheostats for motor, generator and exciter, and autotransformer for starting. The switchgear consists of one synchronous motor panel and one direct current generator panel. Extra generator and motor field rheostats are used for control at various locations around the wind tunnel.

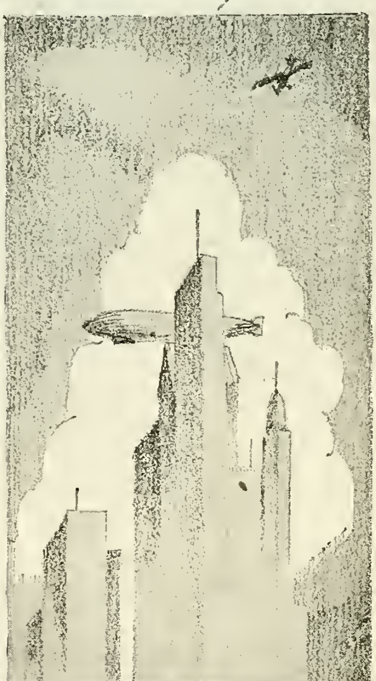
RESEARCH TUNNEL OF THE N. A. C. A.

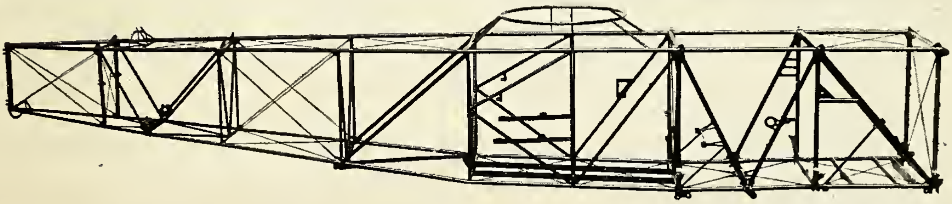
THE twenty-foot propeller research tunnel of the National Advisory Committee for Aeronautics is described in report No. 300 of the N. A. C. A. by Fred E. Weick and Donald H. Wood. This report describes in detail the tunnel which has an open jet air stream 20 feet in diameter in which velocities up to 110 m.p.h. are obtained. Although the tunnel was built primarily to make possible accurate full-scale tests on aircraft propellers, it may also be used on full-size fuselages.

Exit cone, experimental chamber and entrance throat of the B/J wind tunnel.







PRUDDEN-WHITEHEAD ALL-METAL TRIMOTOR MONOPLANE

THE Prudden-Whitehead monoplane, the product of Atlanta Aircraft Corporation, of Atlanta, Georgia, is all-metal throughout, of duralumin and duralumin Alclad, and is of the low-wing type.

The fuselage is of the full monocoque type, the bulkheads being formed from sheet duralumin, over which the corrugated Alclad skin is used as a covering.

The monoplane wing is of full cantilever construction, carrying three main spars of duralumin, with Alclad covering. The corrugated metal wing covering carries a portion of the stresses. Ailerons are inset, and the tail surfaces conventional, with balanced rudder.

Possibly the most notable feature is the installation of the engine mount nacelles, or outboard motors, in the leading edge of the wing, carrying a modified N.A.C.A. cowling with collector ring.

The landing gear is of conventional split type, with an Aerol shock strut installation on the main wheels, and oildraulic strut on the tail wheel. Bendix brakes, with high pressure tires, are standard equipment on the plane.

In the appointments of the passenger cabin, special consideration has been given the comfort and safety of passengers. Colors are soft browns and green, well blended. Ventilation is furnished by specially constructed, adjustable ventilators at each seat, the plate glass windows being fixed. The pilot's cockpit windows are shatterproof glass, two of which are movable. The passenger compartment is semi-soundproof. A good range of visibility is to be had not only from the pilot's seat, but from the cabin as well. Seats are upholstered in soft chrome leather. A wash room and toilet are installed. The passenger cabin may be converted into a spacious mail compartment.

Power is furnished by three Wright J-6 R760 engines, and the installation is so made that no factor can affect more than one motor at one time. Fuel, baggage compartment, and all weighty constructions are placed below the passenger cabin.

Cleanness of design and workmanship, the effectiveness of the cowlings and the streamlining have effected an efficient performance.

The plane now produced is an eight-place job, deisgned for transport use, but the company's engineers point out that the design is elastic, and may be applied to larger or smaller construction without material loss of efficiency.

The designer, Mr. George H. Prudden, has long been identified with the development of all-metal multi-motored aircraft, having formerly been associated with Mr. William B. Stout during the development of the Stout metal aircraft.

The sales activities of the company will be under the direction of Mr. Edward Whitehead, who was formerly connected with a General Electric merchandising organization and also headed a large real estate development on the Pacific Coast. Mr. Whitehead served in the World War, seeing active service on both the Western and Italian fronts with the air forces.

Specifications

Span overall	66 feet 6 inches
Length overall	44 feet 10 inches
Height	14 feet ⅞ inch
Wing area	662.5 square feet
Wheel tread	18 feet
Cabin width	5 feet
Seat width	1 foot 6 inches
Length of passenger cabin	10 feet
Height of passenger cabin	6 feet 10 inches
Net weight	5,200 pounds
Useful load	2,535 pounds
Gross weight	7,735 pounds
Payload	1,330 porнds
Wing loading	11.6 pounds per square foot
Power loading (3 engines)	10.75 pounds per horsepower
Power loading (2 engines)	16.1 pounds per horsepower
Gasoline capacity	150 gallons

Performance

High speed	145 miles per hour
Cruising speed	124 miles per hour
Landing speed	55 miles per hour
Take-off (with full load)	7 seconds
Take-off run	384 feet
Climb (sea level)	1,220 feet per minute
Absolute ceiling	17,000 feet
Service ceiling	15,000 feet
Gliding angle	9.5 to 1
Fuel consumption	30 gallons per hour
Oil consumption	1.37 gallons per hour
Endurance	5 hours
Range	620 miles

FLOATS for AERONCA

WHAT are perhaps the smallest airplane floats ever made have been completed in Detroit by the Aircraft Products Corporation for the Aeronca light plane made in Cincinnati. The pontoons are 11 feet long, and weigh only 40 pounds each. They are designed much like the largest pair of floats made for an American airplane, those fitted to the Navy's Ford seaplane, which were also produced by Aircraft Products Corporation.

The pontoons are bolted throughout, and constructed over a frame of airplane spruce and mahogany. Alclad metal is used for the skin, and three water-tight bulkheads are fitted. The concave V-type bottom reduces spray, and contributes to smooth landings.

CUTTER CLEARANCE

A CUTTER clearance gauge, No. 459, designed for the determination of clearance on all types of milling cutters from one-half to 30 inches in diameter, has been developed by the L. S. Starrett Company, Athol, Mass. The gauge is adaptable to end, side, helix, spiral or inserted-tooth cutters.

The gauge consists of a tool steel beam fitted with one stationary foot, a slidably mounted foot, the contact edges of both feet being parallel with the beam, and an upright blade which is adjustable both vertically and angularly. The upright blade is graduated in degrees from 0 to 30. Three simple adjustments are required for the reading. It is possible to use this new gauge without removing the cutter from its arbor.

The all-metal, eight-passenger transport monoplane produc ed by Prudden-Whitehead at Atlanta, Georgia

Switlik Safety Chute Awarded
Approved Type Certificate
on Record Performance

The SWITLIK SAFETY CHUTE with its one piece combination pack cover and pilot chute, was awarded A.T.C. 15 by the Department of Commerce Aeronautics Branch, after a record performance. Here we are giving Department requirements and official record made by SWITLIK CHUTE on tests. SWITLIK SAFETY CHUTES are used by Dept. of Commerce Officials — Air Mail Pilots — European Government Officials and many famous flyers.

RATE OF DESCENT—The rate of descent shall not exceed 21 feet per second. Rate of descent shall be measured by dropping the parachute with a 170-pound dummy man from 2,500 feet altitude. The descent shall be timed from the time of full opening to time of ground impact. This time shall be divided by 2,250 feet as the distance descended in calculating the rate of descent.

Requirement, 21 ft. per sec.
Switlik Time, 16.97 ft. per sec.

	Requirement	Switlik Tests
FUNCTION PROMPTLY—Twelve drops from an airplane with a 170-pound dummy man, from an altitude of not more than 500 feet, airspeed of plane at time of release 70 miles per hour. No twists purposely packed in suspension lines. Parachute must be fully open within three seconds.	3 sec.	2.5 sec. av.
FUNCTION CERTAINLY—Five drops from an altitude with a 170-pound dummy man, from an altitude not more than 500 feet, airspeed of plane at time of drop 70 miles per hour, three twists purposely packed in suspension lines near skirt. Parachute must be fully open with all twists removed within four and one-half seconds.	4½ sec.	3.8 sec. av.
STRENGTH OF TEST—Three drops with the same parachute carrying a 600-pound lead weight dropped from an altitude of not more than 500 feet, airspeed of plane at time of drop 100 miles per hour, no twists, but rigid metallic connections between parachute test webs and weight. No external shock absorbers or material which may act as such allowed. Parachute to show no failure of materials.	100%	100%
LIVE-DROP TEST—Two live drops with 170-pound man on a comparatively still day, near sea level. Additional emergency parachute of approved design must be carried; altitude of drop 2,000 feet. Rider must suffer no discomfort from opening shock and must be able to disengage himself from harness after landing.	100%	100%

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S W I T L I K

SAFETY CHUTE

BLERIOT TRANSPORT

THE Blériot plant, which is located in Suresnes, in the Paris district, has been testing its latest low-wing transport monoplane, known as the Blériot 111-bis. The first model of this type, known as the Blériot 111, was exhibited at the Berlin Air Show towards the close of 1928 and at that time was powered with a six-cylinder 280-horsepower Hispano-Suiza in-line water-cooled engine. Since then several changes have been made. The latest model, the 111-bis, is equipped with a Lorraine radial air-cooled engine of 230 horsepower fitted with an N.A.C.A. type cowling, which is the first appearance of this cowling on a French plane. The plane is also adaptable for the use of the Salmson 250-horsepower and Gnôme-Rhone Titan 230-horsepower air-cooled engines, as well as the geared Hispano-Suiza 280-horsepower engine.

The 111-bis is a four-passenger cabin monoplane which has a semi-thick wing built in two sections joined to the lower part of the fuselage. The wing section at its thickest point is 13.7 inches thick. Its thickness decreases towards the extremities of the wing, the decrease being more pronounced beyond the mid-sections, to which the wing bracings are attached. The maximum chord is 8.2 feet and the span of the wing is 52.5 feet. The wing structure consists of two box spars in duralumin, with metal cross bracings. The ribs are of wood. The wing has a partial covering of plywood for reinforcement and is entirely covered by fabric. Two oblique struts on either side extend from the upper longerons of the fuselage to a point about a third of the span of each wing. These struts are reinforced by small diagonal bracings near the point of attachment to the wing spars.

The forward part of the fuselage, which includes the cabin, is of semi-monocoque construction and is covered with plywood for a short distance beyond the front part of the cabin. The tail surfaces are fabric covered. The pilot's cockpit is forward of the wing and contains two seats side by side, that on the left being for the pilot. The roof of the pilot's cockpit can be quickly removed, allowing its occupants to fly in the open air or to make an exit in an emergency. There is a small luggage space beneath the floor of the pilot's compartment. The fuel tank is carried between the pilot's cockpit and the passenger cabin, and is equipped with an emergency release gear. Its capacity is 169 gallons, sufficient to give the plane a range of 1,050 miles at cruising speed.

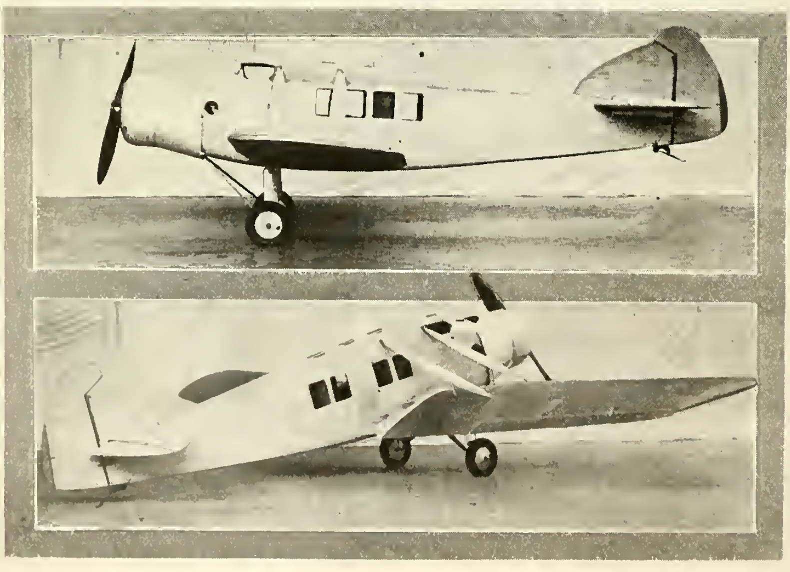
The passenger cabin contains four seats which can be converted into two berths. There are four windows on either side of the cabin, as well as three round windows in the ceiling. A small baggage rack is suspended from the upper part of the cabin. A small lavatory is built in behind the cabin, and a second baggage compartment, accessible from the exterior of the plane, is located aft of the cabin.

The horizontal tail surfaces consist of unbalanced elevating planes and a stabilizer that is adjustable on the ground. The vertical tail assembly includes the conventional fin and rudder. All units of the empennage are of wood construction with fabric covering. A small compensating flap has been added at the trailing edge of the rudder, which is adjsutable on the ground.

The landing gear has a track of eight feet six inches and is of the split axle type. The undercarriage is in two units, each consisting of a set of V-struts extending from the lower longerons of the fuselage and an arm to which the shock absorbers are attached extending from the wing. The Blériot 111-bis has a steerable tail skid.

Specifications

Span	52 feet 6 inches
Length	35 feet 8 inches
Wing area	365.8 square feet
Height	10 feet 3 inches
Weight empty	3,307.5 pounds
Disposable load	1,764 pounds
Weight of passengers and baggage	882 lbs.
Gross Weight loaded	5,071.5 pounds
Wing Loading	13 pounds per square foot
Power loading	18.08 pounds per horsepower
Fuel capacity	169 gallons
High speed	118 miles per hour
Cruising speed	105.6 miles per hour
Cruising radius	1,050 miles
Ceiling	13,500 feet



The Blériot model 111-bis four-passenger cabin monoplane

CRANKSHAFT VISE

A SPECIAL vise for holding the crankshaft and counterbalance of a radial engine is being used in the shops of the Aero Corporation of California. The vise, a special casting, is adjustable to hold any sized radial crankshaft without marring the surface of the engine part. Such a vise also holds the crankshaft and counterbalance in a convenient and rigid position for assembling the master and connecting rod assembly.

Through the use of these new vises in the line production of rod and shaft assembly of Wasp and Hornet engines in the Aero Corporation of California shops, considerable time is saved as compared with the old method of padding and using the conventional vise.

PITCH INDICATOR

A LIQUID type of pitch indicator designed to show instantly any deviations in flight has been developed by Frisbie Aircraft Products, New Haven, Conn. The figures and markings of this indicator are calibrated in degrees and are done in black and deeply etched to contrast with the plate. The vertical scale is of a chrome satin finish designed to resist tarnishing or scratching. The glass tube of the indicator is radium treated for use in night flying, and is deeply inserted in its slot. A red liquid is used to facilitate readings. The width of the Frisbie pitch indicator is 1¼ inches, and the height is 5½ inches. The depth of the instrument is 4⅜ inches and the weight is six ounces.

STAINLESS STEEL LOCK WASHERS

THE Reliance Manufacturing Company, of Massillon and Mansfield, Ohio, manufacturer of lock washers and cold drawn alloy steels, has developed a stainless steel for lock washers. In addition to the qualities of a non-corrosive stainless steel, these washers have a spring temper equal to that of the ordinary steel lock washer.

The stainless steel from which these washers are made is drawn in the company's steel drawing mill at Massillon, and is put through a special rolling process, finished in a Brinell of sufficient hardness to produce the stiffness and reactive pressure necessary in a spring lock washer. The processing of this steel produces the required stiffness without the necessity of heat treating.

"The 'Question Mark' must be fueled with Stanavo Aviation Gasoline"

The "Question Mark" being refueled with Stanavo Aviation Gasoline, preparatory to the good-will tour of Coste and Bellonte.

ABOVE is the order issued by Dieudonné Coste before the start of his American good-will tour. It is significant that Captain Coste, noted for his meticulous care in preparing for his flights, should demand this proved fuel.

Proved fuel; proved by actual flight tests under all climatic conditions; proved by his own flying achievements.

Captain Coste used Stanavo in his flight from Paris to Manchuria—a world's distance record. He used it in his non-stop flight from Paris to New York—and succeeded where so many failed. Stanavo again was used in the flight to Dallas and his good-will tour.

Just as experienced pilots specify Stanavo Aviation Gasoline, so, too, do leading transport lines the world over. You, also, will find Stanavo meets your most exacting requirements for aviation gasoline.

STANAVO

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One Brand—STANAVO. One Quality—the Highest—Throughout the World.

STANAVO SPECIFICATION BOARD, Inc.

Organized and maintained by

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225 Bush St., San Francisco

Standard Oil Company (Indiana)
910 S. Michigan Ave., Chicago

Standard Oil Company of New Jersey
26 Broadway, New York City

PERSONAIRLITIES

BY
Cy Caldwell

IN THE year 1920 the pilots employed by the Post Office Department, Air Mail Service, formed an organization known as "Air Mail Pilots of America." Only pilots engaged in the carrying of mail on regularly scheduled routes were then eligible for membership. By a majority vote of the members of that organization in September, 1927—about the time the last Government-operated air mail route was turned over to a contractor—the name of the "Air Mail Pilots of America" organization was changed to "National Air Pilots' Association," and the constitution and by-laws were revised and amended to permit pilots other than those employed on air mail routes to become members of the association. Pilots holding a license issued by the Department of Commerce and those having a military rating—Reserve officers or National Guard—may now make application for membership.

If you are eligible for membership in the National Air Pilots' Association, I suggest that you write the Executive Secretary, Carl F. Egge, at 1364 Blount Street, Cleveland, Ohio. Speaking not only for myself as a member of the N A P A, but also for all our members, I can say that we would be very glad indeed to have you join us. Just write Carl, telling him who you are and what license or licenses you hold, and that you want to join the N A P A. You'll get a warm welcome from us all.

The object of our association is to advance the cause of Commercial Aviation and to provide closer relationship among pilots, better to enable them to perfect any movement that may be for their benefit as a class, and for the betterment of aviation in general. A publication called the *Journal* is issued monthly from the office of the secretary for free distribution to members, who are invited to, and who do, submit articles of aeronautical interest, and news items. Our little magazine is not intended for general circulation, is not for sale on news-stands, and subscriptions are not solicited or accepted. The publication is a medium for voicing opinions, for constructive criticism, and for keeping the members in touch with one another. Incidentally, it's the *only* magazine I read all through, every month.

In this and in many succeeding issues of AERO DIGEST it is my purpose to run a series of biographies of members of the National Air Pilots' Association, more briefly and usually known as the N A P A, whose emblem is a pair of wings and an hour glass mounted on an undercarriage, and carrying the letters, N A P A. When you see that emblem over a biography it means that the bird I'm writing about is one of our members, and a good egg. Come to think of it, every man I've ever written about in this department is a good egg, whether or not he was also a member of the N A P A. There must be something about the flying business that makes it attractive only to good eggs, for I have encountered no bad eggs in aviation. I have met a very few slightly addled ones, but they invariably stay with us only for a short time, and then move on to the United States Senate or some like place where they'll feel more at home.

IT'S A PLEASURE for me to start this series with a few words about old Dave Behncke, less familiarly known as David L. Behncke, Esquire, Governor of District No. 3, N A P A, with headquarters in Chicago. He and Al Capone are the real rulers out there. Dave rules the N A P A and Al rules everything else. If Al wants to do any bombing from the air, in addition to his customary work, he has to come to Dave.

David L. Behncke, Esq., ruler of Chicago

I've referred to Behncke before in this department, as The Great Behncke, inventor extraordinary. Of course you know about his Crystal Gazing Device for Blind Flying? It consists of a large crystal in which the pilot gazes if he encounters fog. He pays no attention to any other instruments in the cockpit, but simply places himself in a sort of daze, or spell, and concentrates on the crystal mounted directly before him. After several seconds he will see a wonderful picture form in the crystal: instead of fog, scud and smoke, he will see a perfect picture of unlimited flying weather. A beautiful sky and the good old horizon on the rocker arms.

"What could be sweeter?" writes The Great Behncke in his technical description of this life-saving device. "However," he admits, "there is a slight catch to even this highly perfected device. In order to be able to use it successfully it is very essential that you live right. The first time I gazed into the depths of the Crystal Device and concentrated deeply I was surprised to see myself in a wonderful cool old-time barroom, guzzling suds and telling lies to a beautiful barmaid. However, after changing my ways slightly, I noted a great improvement in the crystal. Very recently I even saw a very hazy image of myself paying some long-overdue bills. Moral: Never climb in a glide. Hi-ho! Keep your nose down."

The somewhat facetious ending of this technical description leads me to believe that the throes of composition had somewhat unsettled the massive brain of the master inventor, who also is credited with that great saver of undercarriages, the Retractable Landing Field. This invaluable aid to correspondence school pilots was handed to the world by The Great Behncke shortly after he had himself hit the ground a moment before he had intended to, instantly bounding some thirty-five feet into the air. How nice it would have been, he thought, if some kindly soul had been enabled to withdraw the ground a yard or so, thus permitting the Behncke air vehicle to alight with that softness and aplomb so much desired by the oldest and most conservative pilots. With The Great Behncke, desire is but the father of accomplished thought. A moment's concentration—and the world was presented with that marvellous device, the Retractable Landing Field.

Roughly, the idea is this: In a control tower on the airport sits the Retractor, the gentleman who manipulates the Retractable Field. A pupil is observed gliding in to the

(*Continued on next page*)

(*PersonAlRlities continued*)

ground without the formality of leveling off. Instantly the Retractor grasps a lever, grunts and pulls—and the entire field is lowered the desired number of feet, thus enabling the pupil to make a perfect landing. Should he level off too soon the Retractor reverses his actions, and raises the field, placing it neatly beneath the wheels of the plane, thus baffling the subconscious desire of the manufacturers to sell each pupil a new plane for each landing.

The Great Behncke was introduced to the air by Sgt. James S. Krull when the Air Corps was a branch of the Signal Corps, and he still swears by Krull as being one of the best instructors that ever bawled out a dumb student. The proof he submits to me is that Krull taught him to fly; and he maintains that if Krull could do that, then he must have been better than good. He was commissioned March 1, 1918, and assigned to Chanute Field, Rantoul, Illinois, as Official Test Pilot and Officer in Charge of Inspection, until the end of the war. In 1919 he organized and established old Checkerboard Field at Chicago.

Behncke was on active duty with the Second Bombardment Group that blew up the Pee Dee River Bridge after many said it couldn't be done. He organized and operated the world's first aerial express service immediately after the war, and in his Checkerboard Field operations carried many hundreds of passengers on long and short trips. He has never had a crash, lost a plane, or injured a passenger. And he has had over 7,000 hours in about fourteen very active years. Those hours are actual, not merely conversational, as so many air hours are. He is now flying for Boeing Air Transport, Chicago-Omaha run.

I print below an extract from a recent letter I received from the old walrus when I asked him to favor me with some of his ideas on safety in aviation. As he has spent more than 7,000 hours sitting safely in the air, he should know something about it. I recommend his comments to those who haven't sat quite 7,000 hours in the air, but possibly hope to. He says: "I believe at the present time blind flying is doing more to kill off a lot of the boys than is any other cause. Let the wise boys who *talk* blind flying go out and *do it themselves,* and we won't be bothered with them very long. I believe that safety in the air lies in the use of common sense. Furthermore, if you are going to fly, keep yourself in good training. This flying now and then is not so good. My greatest aim has always been to keep at the peak of training."

RAY WALTER BROWN was born on the first of December, 1896, at Naperville, Illinois. He left it and moved to Hutchinson, Kansas, and Naperville has made no progress since then. While roaming the plains of Kansas, Ray noticed that the Army was not making much progress either, so in order to add a little vim and vigor to a bunch of people who had been slowed down considerably by life in Kansas, Ray joined the Kansas National Guard, and was so highly thought of that he was made a corporal, a very exalted rank indeed. That was early in December, 1916, when Ray became Corporal Brown. And so efficiently did he corp that in only six months he was made Mess Sergeant Ray Walter Brown.

Ray Walter Brown

It occurs to me that Ray must have been quite a bit of a wangler even in those early years when his cheeks were free of down, for the position of Mess Sergeant, even in the hay fever belt, is not one to be sneezed at. I know well the prosperous and bloated condition of all Mess Sergeants in the Royal Flying Corps. Not only did they segregate to their own uses the choicer cuts of beef intended for the officers' mess, but also by the exercise of some quality that must have been magnetic, they invariably drew to themselves all of the squadron's supply of rum rations. Even when there was no rum in the bar, the Mess Sergeant of any squadron I was ever attached to invariably had three or four demijohns of old Jamaica parked under his folding cot.

Now, whether or not Ray followed the tried and true practices of a British Mess Sergeant, I do not know. Of course, there were no rum rations in the American Army, and in Kansas there probably were no free issues of cigarettes, but whatever was going around, I am convinced that Ray must have collected more than his share or else he failed miserably in filling the exalted position of Mess Sergeant. And as Ray is not of the failing type, I conclude that he was highly successful in his efforts.

Had he continued through life in the luxurious status of a Mess Sergeant, I could have some admiration for his intelligence, but the poor fellow apparently suffered a mental relapse; for he joined the School of Military Aeronautics in Texas, as a Cadet—a rank comparable to that of an Army mule. It must have been a terrible comedown for an over-stuffed Mess Sergeant to become a Cadet, and Ray must have felt the fall keenly. I can explain this choice of his only by the fact that he saw service on the Mexican border and probably was suffering from a touch of the sun. However, he struggled along as a Cadet during 1918, and eventually became a Second Lieutenant, complete with wings, at Call Field and later at Post Field, where he was made an instructor and test pilot.

At Gerstner Field he trained in bombing and did test flying. Later in 1918, he went to Park Field and Carlstrom Field as an instructor. During that time he taught many bold young Americans how to elude the Fokkers Overseas. But despite his best endeavors, he couldn't persuade the powers to let him go over there himself. His trouble was that he was just too good; they thought he would be better employed at teaching the young ones how to shoot over here. In fact, now that I come to think of it, I imagine that it was because he proved too efficient as a Mess Sergeant that they permitted him to become a Cadet. In fact, they may even have invited him. Possibly in the endeavor to get something to eat themselves, the officers in that station had to promote him away from the group. I don't know, but from what littl I've seen of Ray's efficiency, I have an idea that it must have been something like that.

During his period of service, Ray Brown had the good fortune as test pilot of gaining actual flying knowledge of practically every type of airplane used or experimented with by the Army as well as to gain mechanical experience with their motors. He participated in the New York to Toronto Air Race of 1919, was Advance Supply Officer for the Alaskan Flight, and also participated in several air events of interest, such as the races at Bolling Field, and the rescuing of sick people from ice-bound islands in the Susquehanna River below Harrisburg, Pennsylvania.

In commercial aviation, he helped to form the sales policy for the Travel Air company, and handled the sales of the entire central states under the great Walter Beech, president of Travel Air. In November, 1929, he became associated with Detroit Aircraft Corporation as sales manager of the central sales district, which position he held until March 1st, 1930, when he was transferred to the Parks Air College division of Detroit Aircraft, and resigned on June 1st, to join the Aviation Research conducted by D'Arcy Advertising Company of St. Louis, Mo. He is now with the Shell Petroleum Corporation.

He has flown 125 different types of ships, twenty-five of them of foreign make. He has flown fifty different types of motors and has piled up over 5,600 certified hours in the air to date. This is a very good record, but I still maintain that Ray Brown would have traveled farther and certainly got fatter if he had just jogged calmly along as a Mess Sergeant.

STEVE McCLELLAN trained with the R. F. C. in Canada and had received orders for overseas duty, when the powers that be discovered three things: he was an American, under age, and had enlisted without his parents' consent. This discovery doubtless saved his life, for they hurled him out on his ear, and by the time he had got squared away with Marine Aviation in the States, the armistice came along and saved him again. He went back to school and amazed his parents by emerging in 1923 as a mechanical engineer. He started

Steve McClellan

(*Continued on next page*)

(PersonAIRlities continued)

flying again merely for pleasure, but pretty soon was working at it as a vocation, doing special test work and experimental flying on radio beacon development for bad weather flying. Then he joined the Pratt and Whitney Aircraft Company as sales engineer. While testing a new plane in which one of their engines had been installed, Steve was somewhat startled to observe that the plane came all apart, which it wasn't supposed to do at all. He told me all about it last year at Los Angeles, and, if I remember correctly, the collapsed flying apparatus traveled from 2,500 feet altitude to the ground in something like six seconds, with the bold Steve pinned in his seat by part of the upper wing and wondering just how he was going to get off before the last stop. As I say, the details are hazy at this date, but I think he stayed with it, somewhat reluctantly, for about four seconds—the time being taken by an interested observer at Bolling Field, toward which the wreckage was hurtling at great speed. Steve pushed pieces of airplane away from him and sneaked out, thanks to the fact that he was wearing a back type, not a seat type, parachute. He wants me to broadcast the information that in an emergency of that kind, with the wreckage of the top wing holding the pilot in his seat, a man with a back pack may force himself out, but with a seat pack he probably will not, for the pack may catch and hold him, and, as more than half of his body is already out, he will be unable to brace himself and pull clear. Anyone wearing a seat pack, if he finds his airplane disintegrating before his eyes, is therefore earnestly advised to send down a requisition for a back type. If neither of these work, take them back and get a lap type.

I did test work for nearly three years and used only the seat pack, as I believe most test pilots do. But Steve's words are worthy of thought by test pilots. Why not two parachutes for test work, as the Army insists on when live jumps are made? When planes fail, parachutes are our only friends.

THAT pilot stepping into the cockpit and pausing to look back at us with a thoughtful, serious, almost sad expression on his face, is not Abraham Lincoln. But he certainly looks like Lincoln, doesn't he? He probably got Lincoln's general appearance as a gift from nature but he collected the thoughtful, serious, almost sad expression I've mentioned by teaching school in Smith Center, Kansas, and North Platte, Nebraska. Teaching school in either Smith Center or North Platte, I believe, is calculated to give anyone a rather sad and serious look.

George I. Myers not only looks like Lincoln, he resembles him in other ways. He is tall and lean and spare; careful and conservative. He is extremely modest and dislikes the limelight intensely. He was a scheduled speaker at a recent banquet, for instance, where after a ten-minute introduction wherein his achievements had been highly praised and the audience had been roused to great expectations, George Myers slowly rose and said: "They tell me that brevity is the soul of wit, so I will stop now. I thank you." And with that he sat down!

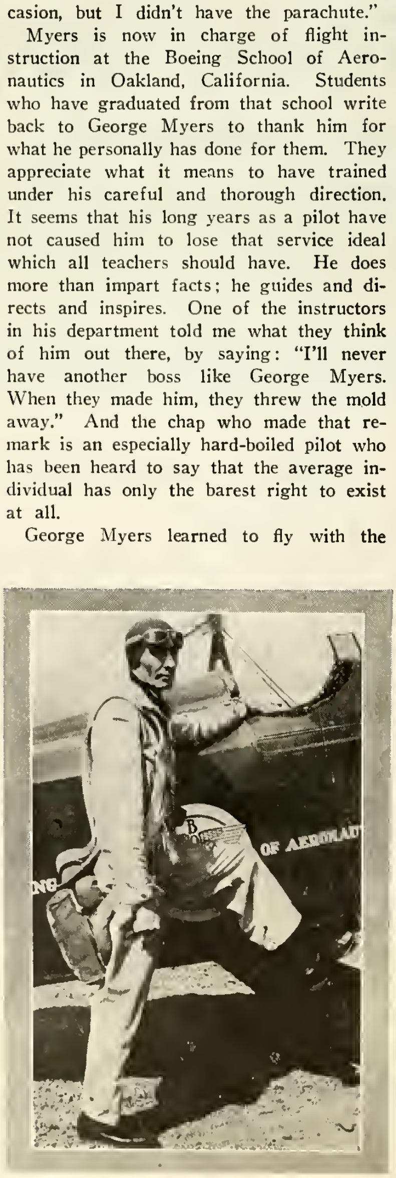
Unlike some pilots who have a yen for boasting of their many narrow escapes, Myers, if he boasted at all, which he never does, would boast that he has had no narrow escapes. His flying is as conservative and as careful as he himself is. One student who longed to hear of thrilling escapades insisted, "But, Mr. Myers, surely you have had occasion to use a parachute?" Whereupon the careful Mr. Myers, after much thought, replied, "Well, once I had the occasion, but I didn't have the parachute."

Myers is now in charge of flight instruction at the Boeing School of Aeronautics in Oakland, California. Students who have graduated from that school write back to George Myers to thank him for what he personally has done for them. They appreciate what it means to have trained under his careful and thorough direction. It seems that his long years as a pilot have not caused him to lose that service ideal which all teachers should have. He does more than impart facts; he guides and directs and inspires. One of the instructors in his department told me what they think of him out there, by saying: "I'll never have another boss like George Myers. When they made him, they threw the mold away." And the chap who made that remark is an especially hard-boiled pilot who has been heard to say that the average individual has only the barest right to exist at all.

George Myers learned to fly with the Army Air Corps in 1919 and was stationed with the Reserve at North Platte, Nebraska. In 1923 he became an air mail pilot. In 1927, when Boeing took over the Chicago-San Francisco air mail contract, Myers was placed on the Omaha-to-Chicago run, which he flew for two years. He participated in an effort of the Boeing System to find the capacity speed of the mail service between Oakland and Chicago. A plane with 40,000 letters left Oakland on schedule but arrived at Salt Lake City so much in advance of its schedule that word was sent ahead to pilots along the line to be prepared to report early. Myers picked up the mail at Omaha at night and flew 433 miles in two hours, forty-six minutes, for the first time in history delivering mail in Chicago the same day it left San Francisco.

Myers has had over 6,000 hours in the air, about 2,500 of which have been at night, in summer and in winter, in good weather and in bad. 2,500 hours at night is so easy to write, isn't it? Just a two and a five and a couple of zeros—and you have it. On paper. But how much stamina and courage and determination must you exert to get that 2,500 hours yourself, in the air? Well, say you make two round trips a week, of four hours of night flying each way. That's sixteen hours a week, or say seventy hours a month. Allowing for vacations and time off, it takes three years to pile up 2,500 hours. Three years of flying back and forth over a lighted airway, taking fog and snow and rain along with fair weather; taking the dreary, pitch black night along with the ones where the friendly old moon is keeping you cheerful company. Taking everything as it comes, the good with the bad, the cheerful with the gloomy. And you're alone. Just sitting there, watching your instruments, picking up your beacons, keeping on your course, sometimes care-free and happy, sometimes very much worried. And you do that for this week, and for next week and the week after, and next month, and all the other months, until you complete a year, and another year, and another. And you've had good trips and tough trips, fair sailing and hard going; you've come up against conditions that almost made you wonder why you stick it. But you stick it, and keep on going, week after week, month after month, year after year. 2,500 hours!

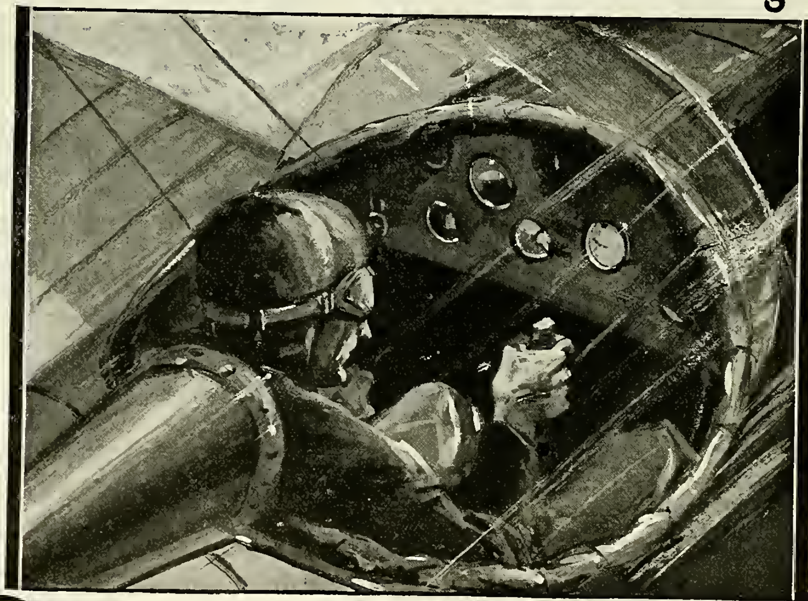
So easy to write, so hard to accomplish in the air. The public, reading of some spectacular flight, is impressed. Personally, I am not impressed, and never have been impressed, by any spectacular flight I have heard of. In the steady progression of commercial aviation those flights are merely bright sparks thrown off at random, as it were—like the flashes that spring from the electric rail, they don't advance the train of our progress. At best, they are merely visual evidence to the public that there is a lot of power in aviation. But what is moving and what will continue to move aviation along are the hundreds of good old boys like George Myers who are plugging along the airlines, by day and by night, carrying people, mail and goods; performing a service—without benefit of publicity.

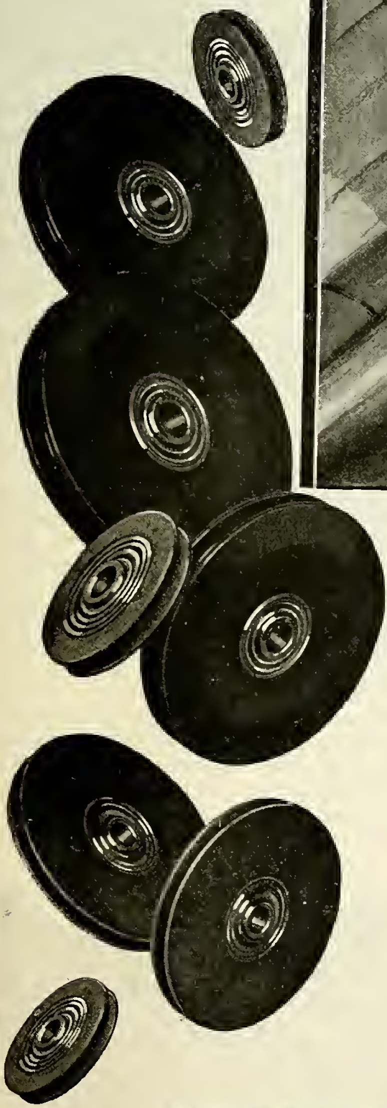


George Myers, the flying Abe Lincoln

IMMEDIATE RESPONSE

When Your Control Pulleys Have Precision Ball Bearings





INSTANT and dependable control, and a new sensitiveness to your will, come to your ship when your control pulleys are fitted with PRECISION Ball Bearings. You have a feeling of added ease and safety.

Both metal and moulded control pulleys, in all sizes and types, can now be had equipped with NORMA-HOFFMANN PRECISION BEARINGS. They hold the pulleys rigidly in line—prevent fouling the supports—make controls instantly responsive by reducing friction—are dirt-and-moisture-proof—are packed with lubricant sufficient for the life of the ship.

For safety and ease of control, see that your equipment includes Control Pulleys fitted with PRECISION Ball Bearings.

Let our engineers aid you with a highly specialized experience.

"NORMA-HOFFMANN"

PRECISION BEARINGS

NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN., U.S.A.

HEATING AIRPORT BUILDINGS

The Gas-Fired Steam Boiler System Used at Port Columbus

By

L. S. Reagan

General Manager, Webster Engineering Co.

ALTHOUGH smoke abatement is a national health problem of more or less magnitude, smoke elimination in the vicinity of aviation fields is a vital necessity, for its presence is a menace to the lives of both pilots and passengers. Therefore, the heating of hangars in cold weather must be accomplished with a fuel that will burn without smoke or fumes. At several airports, gas has solved the problem efficiently and economically.

At Port Columbus, the city constructed a hangar and an administration building, and leased two plots of ground on which similar hangars were erected. One of these was built by TAT-Maddux Air Lines and the other by the Curtiss-Wright company. All three of these hangars are of the roll roof type, built of brick, steel and concrete and are 120 feet wide and 22 feet high to the tops of the doors.

The municipal hangar has a one-story leanto 20 by 190 feet. That of the TAT is 206 feet in length with a one-story leanto 20 by 186 feet. The Curtiss-Wright hangar is somewhat shorter, being 160 feet long with a two-story leanto 20 by 160 feet.

The municipal hangar has two towers on the front corners, each 20 by 20 feet and three stories in height. The heating unit of the building is a low-pressure steam vacuum system. The hangar section is warmed with hot air heated in four giant heaters by the hot steam and forced out by fan draft. Each heater has a rated capacity of 17,000 c.f.m., 1,100,000 B.t.u. and approximately 4,600 square feet of equivalent direct radiation. Each occupies a space of three by seven feet, and the fan is driven by a five-horsepower motor.

In order to keep the hangar section clear of these units, all four were placed in the boiler room and shop section (leanto) and openings left in the brick wall between the two sections for intake and discharge connections. The air in the hangar is recirculated, being taken into each unit through a large register at the floor line and discharged from the unit through galvanized iron flues at the height of about 22½ feet above the hangar floor at a high velocity which carries the warm air clear across the hangar.

These units were designed to maintain a temperature of from 56 to 70 degrees Fahrenheit in the hangar with zero weather outside, and, since the hangar temperature is never allowed to drop below 30 degrees Fahrenheit, they are capable of increasing its heat from 30 to 70 degrees Fahrenheit in twenty minutes' time.

Each unit has a mercoid thermostat that is cut into the electric circuit supplying the fan motor. This instrument is located in the recirculating air intake to the unit and is adjusted to start or stop the motor as the temperature of the section heated by the unit falls below or rises above 70 degrees Fahrenheit. The leanto is heated by three Modine units. The towers which contain the offices, rest rooms, first aid, etc., are heated by direct radiation (steam radiators).

The total equivalent direct radiation for the building is approximately 24,000 square feet and is taken care of by a 168 h.p. Kewanee boiler designed for burning gas and with a rated capacity of 25,000 square feet of direct radiation. Gas is used to eliminate smoke which is a serious factor when in proximity to an airport.

There are two gas burners under the boiler made by the Webster Engineering Company, Tulsa, Oklahoma, a subsidiary of the Surface Combustion Company, Toledo, Ohio. They are used on nearly all types of boilers because they can be inserted into the fire box with little or no alteration to the opening and doors. Unique in simplicity of construction and economies affected, these burners consist of a cast iron frame with refractory elements. In this way radiation, the fastest known method of heat transfer, is obtained.

A mixture of gas and air flows through the center of a refractory tunnel and secondary air is admitted from the sides in the correct ratio for complete combustion. This assures the highest temperature and lowest fuel consumption. This means highest efficiency at all loads and a flexibility of operation not (*Continued on page* 102)

Heating plant, municipal hangar, Port Columbus: Left, gas-fired boiler; right, blowers in leanto which force heated air into hangar

A PROBLEM OF AIR TRANSPORT

The Importance of Holding to Schedule

By William B. Landis

THE speaker was the advertising manager of a large manufacturing concern, a man with frequent occasion to travel and with an aversion to riding on trains.

"Why don't you travel by air?" I asked him.

"Ha!" he replied, "these airlines are not dependable. When you start to the airport you don't know if the plane is going to leave or not; and if it does leave, you have no assurance that you won't be set down in some town and left to complete the trip as best you can."

As this man spoke I realized the truth and significance of his remarks. Like hundreds of others who really would like to travel by air, he refrains from doing so, not because he thinks airplanes are unsafe or the fares too high, but because he believes that air travel is not dependable. And in many respects he is justified in his attitude, for canceling flights or interrupting them at any point along the route has perhaps done as much as any other single factor to retard complete public acceptance of travel by air. The greatest appeal for airplane travel lies in its time-saving advantages. Yet, if flights are postponed, halted in progress or canceled entirely, the advantage of time saving is destroyed and the disadvantage of inconvenience and delay invades in its place.

Picture an executive with an important engagement to fill in a distant city. He hastens to the airport, intent upon taking an airplane to his destination and thereby saving considerable time. The ship is standing in front of the hangar when he arrives. Airport attendants walk about, squinting at the skies. Mysterious conferences are held. Finally a man comes over to the would-be passengers with the disconcerting information. "It's pretty soupy up the line and we're not going out this morning. Come back this afternoon and most likely the ship will go then."

To the executive with immediate business at the other end of the line, it is highly important that the morning ship make the trip. If he waits for the afternoon plane, or if he returns to the city and catches the next train, he will be late. Moreover, he has no assurance that even the afternoon ship will take off; and if it doesn't, he is then faced with the problem of deciding whether to take a night train or wait over to give the airline another try the next day. In either case, however, he has been subjected to considerable loss of time and to the inconvenience of repeated trips to and from the airport. After two or three such experiences, Mr. Executive will no doubt give up the idea of future air travel.

You can imagine, too, what the other disappointed passengers must think. I know. I've been among them, and I've heard their mutterings. "What are airplanes to be held back by a few clouds, anyway?" "Are the darn things so flimsy they can't fly except in perfect weather?" "If these things are as unsafe as that, we'd better take the train. Come on, Aggie," says one passenger to his wife; and off they go, forever convinced that air travel is not the thing for them.

Of course, in such groups there are a few passengers who understand why trips are canceled. They know that, whereas steamships can grope their way through fog and express trains can wait for the tracks to be cleared, an airplane must keep up its flying speed. They realize that it cannot reduce its speed below the stalling point, that it cannot wait around in the skies for the weather to clear and that it must therefore avoid bad weather as much as possible.

The fact remains, nevertheless, that most of those persons who may use the passenger airlines know little and care less about the weather or the dynamic forces which sustain an airplane; they are concerned only with traveling from one place to another as quickly, comfortably and safely as possible. If air travel is to be sold to the public, if it is to become a universally accepted and widely used means of transportation, it must be developed to such a degree that its service is dependable throughout changing weather conditions.

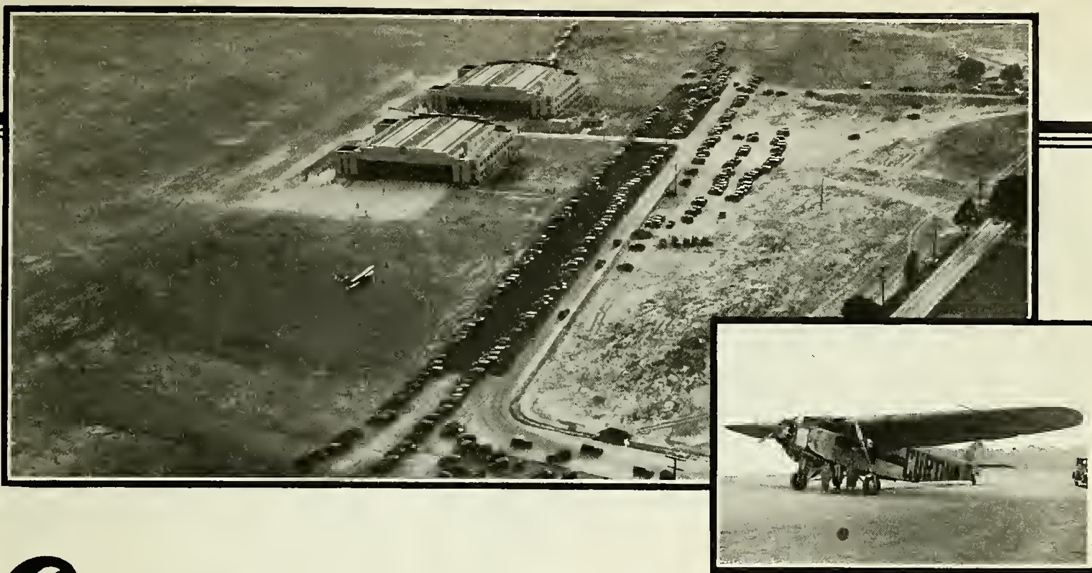
Mind you, I am not suggesting that an attempt be made to hold airplanes to schedule in spite of any sort of weather. Not in this stage of progress, at least. Until methods of blind flying are sufficiently perfected to allow flights through fogs and storms, airplane trips will have to be canceled if bad weather prevails at the time scheduled for the take-off, and they will have to be halted in progress if unfavorable conditions are encountered en route.

Airline operators realize this, of course, and they have proceeded on that basis. Some of them act, however, as though their responsibility ends there. It apparently has not occurred to them that passengers resent being dumped out, miles from their destination, and left to their own resources and ingenuity for the continuance of their journey. Whoever heard of a train stopping at some point along the route because of an unforeseen difficulty, the passengers being forced to wait in some dinky town until the next day when another train came through, or being compelled to complete the journey by bus at their own expense? I recall an occasion last fall when the Santa Fe Railway suffered a serious washout along its main line. Were the trains run up to the point where the tracks had been washed away, and the passengers left to shift for themselves in finding a way to complete the journey? Of course not. The trains were re-routed over the Southern Pacific tracks and the journey was completed with no inconvenience to the passengers.

Compare this procedure with that usually followed by airline operators. On one of the principal airlines of the West, whose service is unsurpassed anywhere in the world, flights are interrupted and the passengers subjected to the inconvenience of delay. I have in mind an occasion when a westbound ship of this line encountered bad weather near an Arizona city. The ship and the passengers were detained at that point until the skies cleared—some twenty-four hours later.

Another time, while en route between two Western cities, the ship on which I was a passenger stopped at an intermediate station and while it was on the ground a rain squall came up. The pilot, with sensible caution, decided to wait a while. That was Monday; it was Thursday before that ship got off the ground.

Of course, the operators of these airlines are to be commended for their judgment in canceling a trip rather than risk the hazards of rough weather. Holding the planes on the ground until good weather returned was certainly the thing to do under the circum- (*Continued on next page*)



CURTISS-WRIGHT AIRPORT *selects* AMOCO-GAS

BALTIMORE is proud of that new million-dollar airport erected by the Curtiss-Wright Flying Service at Green Spring and Smith Avenues, Baltimore.

It's a large, modern, completely equipped field--conveniently located at a point from which the center of the city can be most quickly reached. It has the only aviation school with transport rating south of New York and north of Miami.

And Baltimore has another good reason to be proud of that great airport. For Amoco-Gas [Aviation Grade] has been selected as the motor fuel best meeting the highly-set requirements of Curtiss-Wright. Every one of the scores of planes at the field is fueled with Amoco-Gas. This is indeed a tribute from one great Baltimore institution to another.

It's the trend of the times. Eastern airports, that demand the maximum in performance and in dependability, are using Amoco-Gas [Aviation Grade].

The AMERICAN OIL COMPANY
Affiliated with the Pan American Petroleum and Transport Company
General Offices: American Bldg., Baltimore, Md.

(*Continued from preceding page*)

stances; but the circumstances ought to be changed, for the day is not far distant when the traveling public will be less tolerant of such inconvenience. Rather than set the passengers down along the route and leave them to decide whether to take a train or wait until the ship can fly again, the airline operators might better work out a system whereby passengers can be carried by rail or motorbus to a point farther along the route, from which the journey can again be resumed by air.

Railroads have a sort of coöperative arrangement by means of which they can help one another in emergencies. The case of the Sante Fe train's being re-routed over the Southern Pacific tracks is an apt example. Why can't airlines have a similar arrangement? For example, if a TAT-Maddux ship flying west is warned that bad weather lies beyond St. Louis, would it not be a good idea for the ship to proceed farther west over the route of the Southwest Air Fast Express or perhaps for the passengers to be transferred to a Safeway ship and their journey continued —rather than to be held in St. Louis until the weather clears? If weather conditions along the Safeway (or some other optional route) were unfavorable the passengers might well be placed on a train and carried to a point farther west where favorable weather would again be found.

Air travel must be developed to the point where the dependability of its service is at least comparable to that of the railroads. The importance of maintaining schedules cannot be over-emphasized; and yet in endeavoring to conform to published schedules, airline operators must not lose sight of the fact that of all the factors involved in the operation of an air transport system there is none so important as safety. In his efforts to fly his ships with clock-like regularity and to keep the passengers moving toward their destination even when the planes cannot fly, the transport operator must remember that safety and dependability are synonymous terms as far as air travel is concerned.

Safety can be attained only at the price of eternal vigilance. Care must be taken to see that the equipment is in perfect order at all times. Safety does not lie alone in the careful handling of the ships by seasoned pilots of mature judgment; it depends equally upon competent mechanics, thorough inspections and painstaking work. Accurate weather forecasts and an abundance of emergency landing fields are of equal importance. Lines should be laid out so that emergency landing places are at all times within a reasonable gliding distance of the airplanes.

With landing fields at intervals of twenty-five miles along an airline route, the situation would be ideal. These fields need not be large or elaborately equipped; they need merely offer a pilot in distress a chance to sit down, as well as ample room to take off again. The cost of such installation of emergency airports would not be prohibitive, especially when one considers that such expenditures would be made in behalf of safety and that without the highest degree of safety air travel can never hope, or even deserve, to gain complete public confidence.

Of course, on routes in the far West and in certain sections of the East, topographical conditions would make it impossible to build landing fields every twenty-five miles. It is over such routes as these that the necessity for multi-motored equipment becomes apparent.

The use of the radio, which has become so widespread during the past year, will undoubtedly continue to add much to the safety of air travel. The greatest unsolved problems are those involving bad weather flying and the necessity for strict adherence to schedule. True, solutions of these problems are difficult; but there can be no doubt that they will be solved.

When the conditions I have outlined have come into actual existence along our airlines, and when safety and dependability and adherence to schedule have been perfected to the highest degree, air travel will reach that goal toward which it is now striving.

HEATING AIRPORT BUILDINGS

(*Continued from page* 98)

found in any other burner. The burner will operate at pressures in pounds or down to two ounces at the nozzle. Variations in gas flow do not affect the mixture nor the combustion, both of which are maintained constant. Furthermore, this burner can be forced to high ratings without the "puffing" or "vibrating" which is so hard on boilers at their settings.

These burners are so made that they will fit the ash pit door openings of practically all boilers. If it is not desirable to remove the grates, the burners can be placed in the fire door openings and the grates covered with brick. They are constructed in such a range of sizes and capacities as to be readily applicable to any piece of equipment where gas firing is desirable.

This boiler is equipped with full automatic control for steam pressure, which causes the valves on the gas supply lines to the burners to open and close as the steam pressure in the system falls below or rises above a predetermined pressure. Furthermore, if for any reason the water line in the boiler drops below a certain level, there is another control which acts to shut off the gas supply to the burners.

In addition to these controls, there is another which shuts off the gas supply to the burners if the electric current should fail in the building. This control was installed to take care of the condition that would arise should the vacuum and boiler feed pump motor stop and cease returning water to the boiler. These controls make the system absolutely fool-proof.

The pressure control consists of a mercury tube in a horizontal position which a drop in pressure will tip up. This allows the mercury to run into one end and around two contacts, thus causing a current of electricity to flow through a motor on which are two arms. One of these arms has a chain to quick acting valves in the gas supply lines to the burners, and the other is connected with the shutters controlling the flow of secondary air into the fire box.

The motor when operated causes the arms to move upward opening the valves and the shutters. This is done so slowly that there is no flash back. When the pressure is up to a certain point, the mercury dumps the other way, causing the valves and shutters to close.

In the administration building, a low-pressure steam vacuum system with a Consolidated boiler is used for heating with direct radiation (steam radiators). The total calculated equivalent square feet of radiation is about 3,000 square feet. The guaranteed rating of the Combination Triple Service boiler is 4,000 square feet and the same type of gas burner previously described is used.

The TAT-Maddux hangar is heated with a 130 h.p. Kewanee boiler and the Curtiss-Wright hangar with a 110 h.p. Pacific boiler, both equipped with Webster Radiant burners and the automatic controls described. The heating area of the Curtiss-Wright hangar was reduced materially by the laying of a ceiling at the height of the doors and sealing off the space between the roof and bottom trusses.

Take off with "CATERPILLAR"

THE big transport planes take off on time-table schedule with a nimble "Caterpillar" Tractor's help. For "Caterpillars" have ample traction to snake the biggest jobs in and out of the hangars to the runways. With their rolling tracks the "Caterpillar" weight is distributed over a large supporting surface. "Caterpillar" tracks roll over the airport easily without cutting up its surface. "Caterpillars" are as agile as pursuit ships. They turn around in a hangar like a top! The airport manager knows how economically and quickly his "Caterpillar," with a bulldozer or scraper, takes off the bumps and gullies on the field. How it hustles after a rain and fills the hollows and scrapes the rough spots smooth again. Time and money are saved when a "Caterpillar" is ready to take off at your airport!

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
SIXTY	$4175		

Caterpillar Tractor Co.

PEORIA, ILL. *and* SAN LEANDRO, CALIF., U. S. A.

Track-type Tractors Combines Road Machinery

(There's a "Caterpillar" Dealer Near You)

CURRENT AIRPORT AND AIRWAY FACTS

Aviation Corporation Starts Atlanta-Los Angeles Air Line

INAUGURATION of the Southern Transcontinental Air Mail Service from Atlanta, Ga., to Los Angeles, Calif., by the Aviation Corporation was held October 15 when a fleet of nine trimotor Fokker planes carrying mail and passengers began operating over the 2,102-mile route via Dallas, Texas.

The new service is that of the American Airways (Southern Air Fast Express, Inc., division), a transport line headed by F. G. Coburn, who is also president of the Aviation Corporation. On the opening of the new line, transport planes took off simultaneously from Atlanta and Los Angeles and inaugurated the two-day service with stops at Jackson, Miss.; Shreveport, La.; Dallas, Fort Worth, Big Spring and El Paso, Tex., and Douglas, Tucson and Phoenix, Ariz. Dallas is the overnight stop on the line. Planes will leave daily from Atlanta and Los Angeles and eastward and westward from Dallas.

The formation of Southern Air Fast Express is the outgrowth of the joint bid submitted for the southern transcontinental air mail contract by Robertson Aircraft Corporation, a subsidiary of American Airways, and Southwest Air Fast Express, Inc., controlled by Erle P. Halliburton.

While provision for the lighting of the route has been made by the Department of Commerce, to expedite the work American Airways is itself proceeding with the construction of ten airways revolving beacon lights on the route between San Antonio and Big Spring and proposes the construction of four other beacons along the main line. The Department of Commerce, engaged in lighting the main route, is constructing 150 thirty-six-inch beacon lights between San Diego, California, and Fort Worth, Texas.

The 2,100-mile route from Atlanta to Los Angeles calls for mail stops at Jackson, Mississippi; Shreveport, Louisiana; Dallas, Fort Worth, Big Spring and El Paso, Texas; and Douglas, Tucson and Phoenix, Arizona. In addition a spur line mail route, connecting with the transcontinental planes, will be operated between San Antonio and Big Spring, Texas.

A twelve-hour schedule will be maintained between Los Angeles and Dallas and a seven-hour schedule between Dallas and Atlanta. The Dallas airport will be used as a night lay-over point for both east and westbound liners. Fare from Atlanta to Los Angeles is $147.15. The rate set by the Post Office Department for the transportation of mail over this route is 40 cents a mile up to 225 pounds, with a change in rate in the event this poundage is exceeded.

The Southern Air Fast Express line will be added to American Airways' southern division, which now consists of the lines formerly operated by Southern Air Transport.

During August, lines of American Airways carried 5,882 passengers, and from January to August 31 this year, its ships flew 4,719,409 plane miles in scheduled service and carried 378.2 tons of mail.

Announce 36-Hour Transcontinental All-Air Transport Service

THE thirty-six-hour coast-to-coast service of Transcontinental and Western Air, Inc., carrying passengers and mail on an all-air schedule between New York City and Los Angeles, Calif., was to start October 25. According to the final plans announced October 17, the new service was to start simultaneously from both the Atlantic and Pacific Coast termnials; the first planes taking off from Newark Airport at 8 a.m. Eastern Time and from Alhambra, Los Angeles, at 5 a.m. Pacific Time. Service from the intermediate terminals at Kansas City and Amarillo, Texas, was also to start on October 25.

Transcontinental mail and passengers on the all-air line will remain overnight in Kansas City, leaving the next morning at 6:35 o'clock eastbound and 8:30 o'clock westbound, arriving in New York at 6:18 o'clock and in Los Angeles at 8 o'clock the same evening.

A second transcontinental service by air and rail will be in effect with passengers using trains of the Pennsylvania Railroad between New York and Columbus, Ohio. Passengers exercising this air-rail option will fly from Columbus via St. Louis, Springfield, Mo., Tulsa and Oklahoma City, remaining overnight in Amarillo, Tex. Mail will be carried on this line between Amarillo and St. Louis.

Other air-rail options for passengers will be in effect by way of Chicago with a plane connection at Kansas City.

The flying equipment of the line, which is an operating subsidiary of Western Air Express and Transcontinental Air Transport, will consist of a fleet of Ford and Fokker trimotor planes each with a capacity of ten passengers and capable of an average speed of 125 miles per hour. The Fokker F-32 planes will be in service between Los Angeles and San Francisco.

INASMUCH as the Government has not yet built its aviation beacon lights as planned for the airway from Los Angeles southward, the TAT-Maddux Air Lines altered schedules on October 1st for all afternoon or evening flights between Los Angeles and Agua Caliente. The newly arranged departures and arrivals are all so timed that all flying is within the legal daylight limit of not more than one-half hour after sunset. The new plans are to be operated during the winter months only, according to H. W. Beck, traffic manager. Airplanes in both directions depart at 4:15 p.m.

THE short passenger air service operating at the frequence of interurban trolley cars has proved itself successful in the first half year of operation across San Francisco Bay.

Traffic and revenue figures and operating data on the basis of its first six months have been released by Air Ferries, Ltd., showing the company in the unique position of carrying more than 46,000 paying passengers between February 1st and July 31 by the fleet of four Keystone-Loening amphibions which cross San Francisco Bay every twenty minutes and serve the neighboring cities of Oakland, Alameda and Vallejo. These figures show an average of 254 passengers every day. One peak day registered 947 passengers.

The company's gross revenue approximated $91,000 from all sources. These include the passenger fares which range from the $1.50 trans-bay fare to the $6.00 San Francisco and Golden Gate scenic flight, the delivery service which is maintained in conjunction with Western Union, express, commutation "scrip," charter trips, and the ten-cent taxi services which carry passengers between the terminals and the uptown districts of San Francisco and Oakland.

Traffic in the first three weeks of August showed an average increase of thirty per cent over the corresponding weeks of April, May and June, early months when the company was still drawing heavily from "curiosity traffic."

A questionnaire presented to passengers on three successive week days developed that eighty-one per cent of the present traffic is composed of passengers who are using the air ferries, instead of other means of transportation, to save time. The questionnaire disclosed as another significant fact that seventy-three per cent of the week-day travelers were "repeat" patrons.

An extensive program of expansion was also made public in a statement by Joseph J. Tynan, Jr., president. This program includes extension of service to additional bay and river points; the increase of trans-bay service frequency from twenty minutes to every ten minutes when traffic warrants; the inauguration of new Vallejo schedules; additional connection with other means of transportation; and the possible inauguration of night service. A survey of the latter proposal is now being made.

The 50,000th passenger to fly across San Francisco Bay by air ferry was recorded September 9.

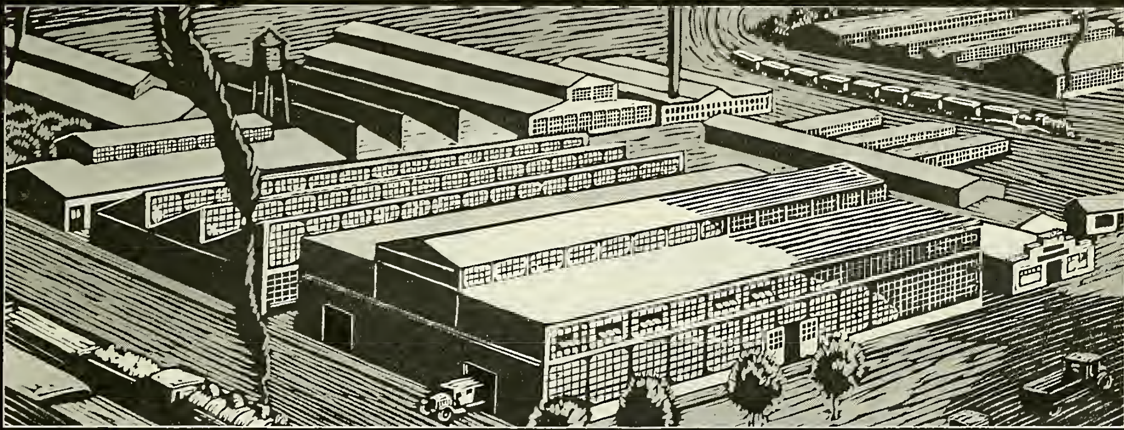
AT THE Los Angeles Airport in June the total number of landings exceeded 6,100. In July and August there were more than 7,500 landings each. During September there was a seasonal recession to approximately 6,000. The volume of operations at this Los Angeles airport has approximately doubled within a year.

NINE additional telegraph typewriters to complete the airways' weather reporting service between Boston and Atlanta have been ordered installed by the Department of Commerce.

The Atlanta-Richmond circuit, which is the part of the service being equipped, is one of several, aggregating approximately 3,000 miles, which will be added this year to the 5,600-mile system already built up.

The typewriters are to be placed at Atlanta and Jefferson, Georgia; Anderson and Spartanburg, South Carolina; Charlotte and Greensboro, North Carolina; and South Boston, Crewe, and Richmond, Virginia.

In all Types and Sizes



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Standardized units quickly erected.
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All Types Available: Swing, Slide, Vertical Folding, Lift, Bifold, and Lift-Swing for any opening.
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Scientific, economical ventilation.
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THE AIR SERVICES

FLYING ABILITY BASIS OF RESERVE PILOT RATINGS

THE Army Air Corps is making a determined effort to rate Air Reserve pilots according to their actual flying ability in order to evaluate properly its Reserve component, the War Department announced October 7. There are 3,108 Air Reserve officers holding heavier-than-air pilot ratings; 2,155 as Junior Airplane Pilot and 863 as Airplane Pilot. It is planned to give the advanced rating of Airplane Pilot to as many Junior Airplane Pilots as can qualify.

"Undoubtedly, many of our 2,155 Junior Airplane Pilots are capable of passing the more stringent flight tests and receiving the A. P. rating," Major General James E. Fechet, Chief of the Air Corps, said recently. "Some of them are engaged in commercial aviation and are very capable pilots, but are neglecting to apply for the higher rating. The Air Corps has been steadily eliminating all deadwood among Reservists and has avoided training those who have shown they were not receiving benefit from further flying training. The Air Crops is just as diligent to rate properly its pilots and give the advanced rating to those lower rated pilots who can qualify for the A. P. rating. In this way the Air Corps can make a reasonable estimate of the potential worth of the Reserve body in the event of a national emergency.

"In addition, it behooves Junior Airplane Pilots to qualify, if possible, as Airplane Pilots, as only the latter will hereafter be called to extended active duty with tactical units for a period of one year."

To be eligible to take the flight tests for the rating of Airplane Pilot, a Junior Pilot must have at least 200 hours pilot time, seventy-five hours of which was made with no other qualified pilot present in the airplane. Of the 200 hours pilot time, at least 100 hours must have been in service type airplanes, i. e., in an airplane powered with an engine of 300 horsepower or over; and at least forty hours of the 200 hours must have been within the twelve months preceding the date of application for the required test. Flying experience of 400 pilot hours in any type airplane is acceptable in lieu of the 100 hours in service type airplanes.

Award Contracts for Construction at Naval Air Stations

IMPROVEMENT and construction of works at several Naval Air Stations is included in contracts totaling $571,560 awarded by the Bureau of Yards and Docks for construction at naval bases. This work at the Naval Air Stations is as follows: Extension of Station Pier at the Naval Operating Base (Air Station), San Diego, Calif., awarded to M. H. Golden, for $101,000; improvement of flying field at the Naval Operating Base, Hampton Roads, Va., awarded to E. P. Lindsay, for $38,833; moving buildings Nos. 103 and 115 at the Naval Air Station, Seattle, Wash., awarded to C. L. Pehling, for $1,075; and boilers, oil burners and flue at the Naval Air Station, Pensacola, Fla., awarded to Columbia Contracting Company, for $59,442.

Two New Air Corps Squadrons Formed in Hawaii

ORGANIZATION of two aviation squadrons in Hawaii has been authorized by the War Department. These squadrons, which will be designated as the 26th Attack Squadron and the 75th Service Squadron, will be in addition to the Air Corps forces now stationed at Hawaii and will be organized at the earliest possible date. Personnel of the new squadron will be furnished by other Air Corps squadrons in Hawaii having an excess of enlisted men, these squadrons being required to reduce to permanent strength.

Begin Flight Training at Pensacola November 7

FIFTY-ONE junior officers of the Navy have been ordered to report at the Naval Training Station, Pensacola, Fla., November 7, for temporary duty involving flying. Two of the officers are lieutenants and two are lieutenants, junior grade. The remainder are ensigns. This group will probably make up the first of the current year's aviation classes at Pensacola.

95th Pursuit Squadron Receives New Boeing Pursuits

THE second consignment of new type pursuit planes from the Boeing Airplane Company of Seattle, Wash., has been received by the 95th Pursuit Squadron, Rockwell Field, San Diego, Calif. This consignment comprised four single-place Boeing pursuit ships which are in addition to three of the new Boeing pursuit planes previously delivered to the squadron. All of these ships were ferried from Seattle to San Diego by members of the squadron.

Los Angeles to Be in Service for Two to Four Years More

RECOMMENDATION that the dirigible *Los Angeles* be continued in active service for from two to four years, provided regular inspections are made by qualified personnel, was made recently by a Board of Inspection and Survey following an inspection of the airship. It was also recommended that the maximum airspeed of the airship be limited to sixty knots.

The Board pronounced the material condition of the airship generally good and considers, in view of the various conditions encountered and the lack of precedent to guide, that credit is reflected on those responsible for the material upkeep of the airship. The Board believes that the most useful purpose the *Los Angeles* can finally serve is to destroy the craft through tests for the purpose of obtaining data on devices for mechanical handling, landing and mooring airships.

Real Airplanes to be Used as Targets in Aerial Attack to Test Efficiency of Ammunition on Aircraft

AN AERIAL attack on a flying field with real airplanes as targets is scheduled on or about November 1 at Camp Stanley, San Antonio, Tex. A squadron of eighteen planes from the 3rd Attack Group, Fort Crockett, Tex., will fly over the field and destroy twenty airplanes which have been condemned as no longer fit for service. These condemned ships will be arranged on the ground to simulate a squadron of planes at a flying field during war time. The attacking planes will first use small fragmentation bombs and 100-pound demolition bombs for the purpose of determining the relative efficiency of these two types of ammunition. A second attack will then be staged, employing tracer ammunition to test the incendiary effect on airplane structures and gasoline tanks.

AIR CORPS FIELDS IMPROVED UNDER ARMY PROGRAM

THE development of flying fields of the Army Air Corps and the installation at these fields of housing and technical construction is proceeding throughout the country under the housing and technical construction program of the Army which has $35,000,000 worth of construction under way at many Army stations. The work being effected under this program of the Army ranges from the erection of a few officers' quarters or a barracks to the building of practically an entire new post.

Randolph Field, Tex., takes the lead in the number of units and cost of construction, the total cost being approximately $9,780,000 for more than 300 structures in addition to roads, sewerage, water and electric systems, hangars and shops. Langley Field, Va., is second in cost and the amount of construction with approximately $3,000,000 being expended on the development of the field and 120 items of construction being planned.

Of the other flying fields of the Air Corps included in this program, Maxwell Field, Alabama, is appropriated approximately $1,470,000 for quarters, hangars, warehouses and other buildings. Selfridge Field, Mich., is allotted $1,461,000 for quarters, barracks and shops. At Mitchel Field, L. I., the sum of $1,500,000 will be expended for officers' quarters, warehouses, shops and a hospital. The sum of $556,000 is appropriated for the construction of hangars, depot and shops at Duncan Field, Tex.

AWARD BID FOR AIRCRAFT CARRIER

CONTRACT for the Navy's new 13,800-ton aircraft carrier has been awarded to the Newport News Shipbuilding and Drydock Company, according to a recent announcement of the Assistant Secretary of the Navy, Ernest Lee Jahncke. The cost of hull and machinery will be $15,560,000 and the total expense will be approximately $19,000,000. Armor and armament for the new ship, which will cost approximately $3,440,000, will be constructed by the Department.

The vessel, the first aircraft carrier since the Washington naval limitation conference of 1921-22, will be the first carrier in the navy designed from the keel up for aircraft work in the fleet. The *Saratoga* and the *Lexington* were designed as battle cruisers and, under the provisions of the Washington naval limitation treaty, were converted into aircraft carriers.

The London treaty allows 135,000 tons of aircraft carriers each to the United States and Great Britain. The completion of the new carrier will bring the American tonnage to 79,800, leaving 55,200 tons for future construction at any time within the time limit of the treaty which expires December 31, 1936.

The carrier *Langley* is not included in the treaty total, since that vessel is of the experimental type and replaceable at any time Congress sees fit to vote the money.

This new ship will provide accommodations for about seventy-five planes with a considerable number in reserve. No planes are available for the equipment of the carrier, according to Rear Admiral William A. Moffett, and an appropriation will be asked of Congress for this purpose. The present five-year program now drawing to a completion does not include any planes for the new carrier.

Dedicate Hangar of Michigan National Guard

DEDICATORY ceremonies of the new hangar of the 107th Squadron, 32nd Division Air Corps, Michigan National Guard, were held at Wayne County Airport, Detroit, Mich., October 4. The ceremonies, which included an aerial show and carnival, were staged in coöperation with the National Exchange Clubs. The proceeds obtained from the show will be used for outfitting the quarters and obtaining additional equipment.

The aerial events included parachute jumps, formation flying and acrobatics, an altitude flight, and night flying. Addresses by members of the Exchange Clubs, Air Corps and civic officials were given, a luncheon was held in the hangar and the events were concluded in the evening with a military ball.

The hangar was built by Wayne County at a cost of $100,000 and is for the exclusive use of the 32nd Division. The structure is ninety feet by 120 feet and is provided with a machine shop, photographic dark room and two floors containing facilities for offices and storage room.

Fokker Monoplane for Reconnaissance Work Delivered to Air Corps

A MONOPLANE designed for long-range reconnaissance work, especially photographic missions deep into enemy territory in time of war, has been delivered to the Army Air Corps by the Fokker Aircraft Corporation. Flight tests of this ship, which bears the designation XO-27, are being conducted at Wright Field, Dayton, Ohio.

Since the Air Corps normally requires biplanes, the XO-27 is essentially a departure from the usual procedure. Although the ship lacks maneuverability in comparison with the biplane type, this is not considered a disadvantage because the plane is not designed for attack work and will not engage in power dives and other strenuous operations. Long range is the principal feature. Two twin machine guns are provided only for defense. If overtaken by enemy aircraft in time of war, the plane would be expected to flee to its own base and not attempt to withstand an attack. There are no bombs carried.

The XO-27 is powered with two Curtiss 600-horsepower engines recessed into the wing. The radiator is immediately below the wing and the propeller shaft is built into the wing. Landing lights are recessed into the wing. A crew of three is carried, a pilot, observer and radio operator. The cockpit in the bow which is assigned to the observer can be converted into a temporary dark room if desired.

Eighty-Five Students Graduate From Advanced Flying School

EIGHTY-FIVE students graduated from the Advanced Flying School of the Air Corps,, Kelly Field, San Antonio, Texas, October 11. The class comprised forty-three Flying Cadets and forty-two commissioned officers. Of the commissioned officers, thirty-five graduated from the United State Military Academy, West Point, in June of last year. All of these graduating students reported at Kelly Field from the Primary Flying Schools, Brooks Field, San Antonio, Texas, and March Field, Riverside, California, July 1, 1930, at which time the class consisted of forty-four officers, fifty Flying Cadets and one Chinese civilan, a total of ninety-five.

The graduates of this class are divided among the specialized branches of the Army Air Corps, as follows: Attack Section, 15; Bombardment Section, 15; Observation Section, 23; and Pursuit Section, 32.

This is the first graduating class of Cadets at the Advanced Flying School to sign the agreement to serve two years on active duty as Reserve officers or as officers of the Regular Army. It is also the first class which received a course in piloting a plane by means of instruments entirely.

Air Corps Tests Monomail—Receives All-Metal Boeing Pursuit

THE Army Air Corps has completed tests of the Boeing Monomail, six or eight-passenger and cargo, all-metal monoplane, at Wright Field, Dayton, Ohio. The Boeing Airplane Company has delivered to the Army Air Corps an experimental fighting plane of all-metal construction, designed for pursuit tactics and high altitudes.

Although pursuit planes are usually considered as highly maneuverable aircraft, with speed a secondary consideration, this ship is designed for high speeds, particularly in diving, with maneuverability a secondary consideration.

NAVAL AIR UNITS TO BE INCREASED

THE aircraft maintenance force attached to naval aviation will be increased by 560 enlisted personnel as soon as possible, according to an announcement of the Navy Department made October 17. The decision to add to the force is a result of the findings of a Fleet Board which convened last May. The larger part of the enlisted personnel now to be added to the naval aviation maintenance force will be assigned to the Naval Air Stations at San Diego, Calif., and Hampton Roads, Va. The Fleet Board found that in order to accomplish a thorough overhaul of the planes attached to the Aircraft Squadrons of the Battle Fleet and the Scouting Fleet, more personnel should be assigned to these stations. Additional machine shop equipment for maintenance will be provided at these two stations by the Bureau of Aeronautics.

Curtiss Hawk YP-20 Pursuit plane recently tested for the U. S. Army Air Corps

Apparatus Tests Efficiency of Air Corps Pilots at High Altitudes

[M. Cooper]

AN apparatus which determines the altitude at which Air Corps pilots can operate a plane without oxygen and their relative efficiency at high altitudes has been installed at the School of Aviation Medicine, Brooks Field, San Antonio, Texas.

Tests for the efficiency of pilots at high altitudes are made on the ground in an apparatus known as the re-breather. The subject is seated in a chair and breathes only through a tube connected to a tank containing fifty-two liters of air. As he breathes this air again and again, the oxygen is consumed and he gradually loses control of his facilities.

His accuracy is tested by an arrangement which employs both feet and both hands. He must keep constant the speed of an electric motor, controlled by a treadle which he operates with his feet; keep the needles of an ammeter at a certain point on a dial by means of a rheostat in front of him; and at the same time he must operate a series of small lights on a board placed in front of him. The board contains two rows of lights which flash whenever he makes contact between a pointer held in his hand and a metal button on the board. If the subject is not accurate and makes contact with a metal washer surrounding the button, a red light flashes.

Results show that, although individual cases differ widely, in general a big, heavy person will lose consciousness in a shorter time than will a small, lean person who does not require as much oxygen. Some lose consciousness suddenly, as though they had been struck on the head and others continue to go through motions, devoid of accuracy.

With the results of these tests as a guide it will be possible to determine which pilots should be assigned to work at higher altitude, and to estimate what efficiency of the pilot is possible at various high altitudes.

Mather Field Becomes Temporarily an Active Station

MATHER FIELD, Sacramento, Calif., was to become a temporarily active field November 1. No permanent construction is to be undertaken, however, as the units temporarily assigned to this field have permanent stations. Mather Field will again become inactive when permanent quarters for these units are completed at the stations assigned to them.

The opening of Mather Field is being effected to care for the fourth increment of the Air Corps increase. It is planned to use this field to reconstitute units necessary for the fifth increment in 1931. This field was developed during the World War, twelve hangars and about 600 acres being provided, and remained active until 1922 when general Army reductions resulted in its closing.

The following units of the Air Corps will become reconstituted at Mather Field: Headquarters 20th Pursuit Group, 80th Service Squadron, 77th Pursuit Squadron and 55th Pursuit Squadron. These units will be formed by transferring enlisted men from other fields as follows: sixty, Kelly Field, Tex.; twenty-eight, Brooks Field, Tex.; sixty, Langley Field, Va.; fifty-two, Mitchel Field, L. I.; and by assignment of 223 Air Corps recruits. Personnel from the Quartermaster Corps, Medical Department, Ordnance and Signal Corps, will complete the garrison.

Boeing Tests New Pusuit Biplane

A NEW pursuit biplane has been tested at the Seattle plant of the Boeing Airplane Company. The plane, known as Boeing Model 218, has a metal monocoque body, new type straight axle landing gear, and all-metal tail surfaces. Equipment includes Boeing ring cowl and overhead intake. It has been designed and built for demonstration to the Army Air Corps and the Bureau of Aeronautics, Navy Department.

Construction of forty-six Navy Model F4B-2 Wasp-powered Boeing pursuit planes is well under way. These planes are scheduled for delivery beginning January, 1931.

[G. Perrins]

FIRST LIEUTENANT CLARENCE P. TALBOT, of the U. S. Army Air Corps, has assumed his new post as commander of the Air Corps detachment at the municipal airport, Salt Lake City, Utah, and as instructor of the 329th Observation Squadron. He succeeds First Lieutenant Russel L. Maughan, transferred to the Philippines.

Flight Test XP-16

[E. W. Walsh]

FLIGHT tests of the XP-16, an experimental pursuit plane built by the B-J Aircraft Corporation of Baltimore, Md., for the United States Army Corps, were held recently at Wright Field, Dayton, Ohio. The plane was designed with the hope of making it the fastest military pursuit plane in the service of any government and the tests are being conducted for the purpose of showing whether or not the plane is capable of measuring up to the expectations of its designers.

The constructional features of the XP-16 have undergone strength tests satisfactorily. Some time ago the wings of the plane were sent to Wright Field, where they were tested to the breaking point.

In the event that the plane comes through all of its tests satisfactorily and measures up to the speed requirements, it is anticipated that a contract for the construction of a quantity of similar planes will be given the B-J corporation.

The B-J engineers are said to have achieved considerable saving in weight in the new plane.

THE AIR CORPS AND THE PUBLIC

A TREMENDOUS amount of material of an interesting character is prepared by the Army Air Corps for publication and distribution through various channels to the reading public. This information is made generally available as a means of educating the public to the fact that this country has a system of National Defense, describing the work and organization of the Air Corps.

Much of the information gathered and disseminated by the Air Corps is for the information of its members. Those texts which are of interest to all branches of the Army or to those engaged in commercial aviation are printed by the Government Printing Office and published for sale to those desiring copies of them. All texts on Air Corps matters are written by individual officers or by the faculties of the various Air Corps schools and after review by the War Department are turned over to the Governmental body charged with the printing. These may be obtained for a small fee from the Superintendent of Documents, Washington, D. C.

Of particular interest to aircraft manufacturers and aeronautical engineers are the Information Circulars which contain information of a highly technical nature; the results of tests carried on in the field, but more often at the Materiel Division at Wright Field, Dayton, Ohio. Their circulation is limited to engineers, manufacturers and technical libraries of engineering schools.

In addition to these texts and circulars, the Air Corps itself mimeographs and distributes gratis, upon specific request therefor, a number of pamphlets on any of the various items of interest that are answers to the many questions asked them from time to time.

Many questions not related to military aviation are addressed to the War Department or the Air Corps. These are generally referred to the Aeronautics Branch of the Department of Commerce. If they are of a purely scientific nature they are referred to the National Advisory Committee on Aeronautics, and if they deal with record feats of commercial fliers or with contests or flying clubs, they are referred to the National Aeronautic Association.

Photographs illustrating information which is not confidential and which is pertinent to an accurate knowledge of the Army are distributed by the Signal Corps and the Air Corps, the former branch handling ground photography and the Air Corps conducting the aerial photographic service. The Signal Corps charges a nominal sum for its photos. The Air Corps has no provisions whereby it may sell its photos and so distributes them gratis to the public and the press.

The Air Corps News Letter, a semi-monthly publication, is also distributed to aviation editors of magazines and newspapers throughout the country, in addition to stations and schools of the Air Corps itself. It contains articles on Air Corps matters and personal items. Public relations are also carried on by those Air Corps officers who volunteer or are detailed by their local commanders to supply the requests of clubs, civic bodies and other organizations for a speaker on military aviation.

CONTINENTAL TOOLS *are now available with* CARBOLOY

TRADE MARK REG.

Carboloy is the Trade Mark of Carboloy Co., Inc. identifying its Cemented Tungsten Carbide

THRU recent affiliation with the Carboloy Company Ex-Cell-O is now prepared to furnish products manufactured by the Continental Tool Division equipped with cutting faces of Carboloy, a cemented Tungsten Carbide alloy of extreme hardness and superior wearing qualities.

This is the first time that the basic advantages of cemented Tungsten Carbide have been combined with the tool making experience and facilities of a firm like Ex-Cell-O. They are now in a position to produce milling cutters, both solid and inserted tooth type, counterbores, spotfacers, gages, circular and flat form tools, gear cutters, broaches and taps tipped with Carboloy.

In the cutting of such materials as cast iron, aluminum, babbitt, bronze, lead, bohnalite, and other similar metals as well as such non-metallic materials as bakelite and porcelain, Carboloy has increased cutting speed, number of pieces produced between grinds, and life of the tool by percentages which at first seem almost unbelievable.

Complete information regarding Continental Carboloy-tipped tools will be furnished upon request.

CONTINENTAL TOOL WORKS

1200 OAKMAN BLVD. *Division of* DETROIT, MICHIGAN

EX-CELL-O *Aircraft* XLO *& Tool* Corporation

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AERONAUTICAL INDUSTRY

BOYD AND CONNOR FLY ACROSS THE ATLANTIC IN THE "COLUMBIA"

ANOTHER successful eastward crossing of the North Atlantic Ocean by air was completed October 10 when Capt. J. Erroll Boyd and Lieut. Harry P. Connor landed the Bellanca monoplane *Columbia* on Tresco, Sicily Isles, twenty-seven miles from the southwestern tip of England. They had been aloft for twenty-three hours and forty minutes since the take-off at Harbor Grace, Newfoundland, October 9.

A choked fuel line brought the plane to a landing after it had been blown about 150 miles south of the intended course. The ship which they flew is the first one to span the Atlantic twice. It is the same machine that Clarence D. Chamberlin and Charles A. Levine used on their flight to Germany in 1927.

Capt. Boyd and Lieutenant Connor continued on from Tresco the following day to the Croydon Airdrome, London.

Adverse weather conditions were encountered practically throughout the flight, including head winds, fog, rain and squalls. For more than ten hours during the night the plane was navigated by means of dead reckoning.

One of the objects of the flight was to test the efficacy of navigation instruments. Considerable of the difficulties of flying blind, according to the pilots, were eliminated by the use of the Sperry Artificial Horizon with which the plane was equipped. Capt. Boyd and Lieut. Connor were the first trans-Atlantic pilots to use this instrument.

Other flight instruments with which the plane was equipped included a rate-of-climb, turn-and-bank and air-speed indicators, thermometer, tachometer and altimeter. Three compasses were carried: one an earth inductor compass with a dial on the dashboard; one a cowling magnetic compass; and the third a cabin magnetic compass. Navigational instruments consisted of a sextant, longines, aerochronometers and watches.

An object of the flight, according to Lieutenant Connor, was to prove that trans-Atlantic flying could be made safe for passenger and mail service. Although the plane carried no radio, the pilots deciding to rely upon dead reckoning and celestial observation to save the weight of this apparatus, Lieut. Connor believes that radio equipment should be carried on all similar flights in the future if permitted by the lifting capacity of the airplane powerplant. The ideal plane for these flights, he said, is a multi-motored flying boat provided with a seaworthy hull and equipped with radio.

Captain Boyd and Lieutenant Connor accompanied Roger Q. Williams last summer on the non-stop New York-Bermuda and return flight of the *Columbia*. A description of this flight and the navigational methods used were described by Lieutenant Connor in an article which appeared in the August issue of AERO DIGEST.

At a dinner in their honor at the Advertising Club, New York City, October 16, the pilots were presented with a check for $25,000, awarded by Col. William E. Easterwood for their East-West flight from Paris to Dallas, Texas, making one stop en route.

Coste and Bellonte Complete Good-Will Air Tour of the United States

A GOOD-WILL tour of the United States was completed at Curtiss Airport, Valley Stream, L. I., October 10, by Major Dieudonne Coste and Lieut. Maurice Bellonte, the French trans-Atlantic fliers. They had covered a distance of more than 15,000 miles in twenty-five days, were guests of honor at fifty receptions, flew over or stopped at 100 cities and piloted their Breguet plane, *Question Mark*, over thirty States.

P. & A. Photo

Lieut. Connor. (left) and Capt. Boyd who recently completed eastward crossing of Atlantic in the monoplane "Columbia"

MANUFACTURERS AND AERO BRANCH STUDY AIRWORTHINESS CODE

STEPS to bring about greater safety and reliability in aircraft design and construction were taken in a conference between representatives of nearly 100 aircraft manufacturers and officials of the Aeronautics Branch of the Department of Commerce at Washington, D. C., September 26. The conference was held for the purpose of discussion and exchange of viewpoints on changes the Aeronautics Branch proposes to make in Airworthiness Requirements for aircraft.

In addition to commenting upon the proposed changes, made by the Aeronautics Branch, the manufacturers made suggestions of their own. Approximately seventy-five per cent of the proposed amendments to the Airworthiness Requirements were accepted by the manufacturers without comment. The remainder were held for discussion with the Aeronautics Branch. Simplicity of regulation was the keynote of the proposed changes.

Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, presided at the meeting. When the various proposals were submitted and discussed, Col. Young indicated whether or not he believed the change was practicable and would be accepted by the Department. Final action concerning these proposed changes must await further consideration by officials of the Department of Commerce.

Sets Women's Altitude Record for Seaplanes

AN unofficial international women's altitude record of 15,100 feet for seaplanes was established October 20 by Marion Eddy over Manhasset Bay, Port Washington, L. I. She used a Savoia-Marchetti amphibion powered with a 125-horsepower Kinner engine. The barometer used on the flight has been sent to Washington, D. C., for official calibration.

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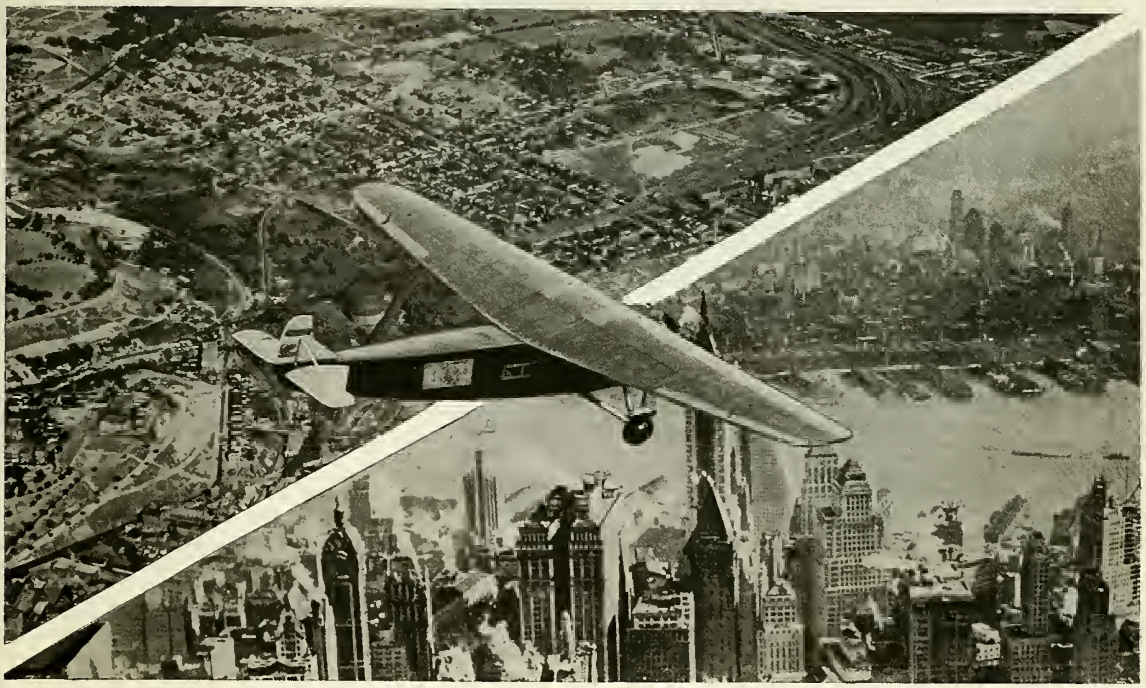
Dixie to Broadway



...3 hours!

AGAIN FOKKER SERVES—from Dixie to Broadway in three hours—schooled through many years of actual experience in serving leading air transport companies of the world, Fokker has been privileged and complimented in supplying equipment to another of those hardy pioneer institutions.

Eastern Air Transport starting their passenger line between Richmond and New York City on August 5th of this year, and desiring to provide the most comfortable and dependable service between these important terminals with stops at Philadelphia, Baltimore and Washington, selected the Fokker AF-10A to meet the demands of their chosen clientele.

Now pilots of Eastern Air Transport — veteran air line operators from New York to Miami—with more than 3,000,000 miles of flying on this particular route to their credit, guide these luxurious Fokker trimotors at 126 miles per hour, the fastest and most reliable passenger planes in operation today.

Other outstanding airway operators using Fokker equipment are Western Air Express, Universal Airlines, West Coast Air Transport, Pan American Airways, National Parks Airways, Standard Airlines, Midcontinent Air Express and Western Canada Airways

Because of economies due to production principles of General Motors, prices are probably less than you might expect. Convenient terms may be arranged on the GMAC Finance plan. *Ask for Fokkers when you fly.*

For the use of business executives, for pleasure, and for transport use, Fokker now makes ten different models of airplanes: single and multi-engined types, land planes, sea planes, flying boats, amphibions. Requests for information or demonstration are invited, and will be promptly answered. Fokker Aircraft Corporation of America, General Motors Building, New York

FOKKER

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Women's Transcontinental Records Broken and Re-broken

THE women's transcontinental record was broken four times last month.

Miss Laura Ingalls was the first to set a new mark for the East-West flight. Her record was short-lived, for Mrs. Keith Miller lowered the mark less than a week later. Meanwhile, Miss Ingalls had started east. She succeeded in setting a new women's record for a coast-to-coast flight in this direction, as Mrs. Miller was starting east over the same route in an attempt to lower the new West-East mark.

Miss Ingalls landed at Los Angeles October 8 on the flight from New York, estimating her total elapsed time as thirty hours and twenty-seven minutes. On October 16, Mrs. Miller finished her coast-to-coast flight from New York to Los Angeles in twenty-five hours and forty-four minutes, breaking Miss Ingalls' new mark. While Mrs. Miller was still flying west, Miss Ingalls was en route to New York after the West-East record. She successfully completed this flight at Roosevelt Field, L. I., October 18, setting a new mark of twenty-five hours and thirty-five minutes. On October 26 Mrs. Miller landed at Curtiss Airport, Valley Stream, L. I., with a new West-East record for women of twenty-one hours, forty-seven minutes.

Fifty Scheduled Interstate Passenger Air Lines Now Operating Under Letters of Authority

FIFTY scheduled interstate passenger air transport lines are being operated under Letters of Authority issued by the Aeronautics Branch of the Department of Commerce, pending action on their application for Certificates of Authority, according to a recent announcement of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Sixty applications have been received since August 15 when the regulations requiring that application for Certificates of Authority be made became effective.

New Procedures for Obtaining Aircraft Licenses and Changing Base by Limited Commercial Pilots

NEW methods of procedure to facilitate the issuing of identification and license numbers to aircraft and the handling of applications of limited commercial pilots for changes in bases, have been effected by the Aeronautics Branch of the Department of Commerce, according to an announcement made October 20 by Col. Clarence M. Young.

P. & A. Photo

Robert Buck greeted by his mother after setting new junior records

Under the new policy, owners of new aircraft may obtain identification and license numbers from inspectors of the Aeronautics Branch in the field without applying directly to the Aeronautics Branch in Washington.

Limited commercial pilots may apply directly to an inspector for authorization to change their bases of operation without applying directly to the Aeronautics Branch.

Report Air Commerce Violations

TWO hundred and seventy-eight violations of the Air Commerce Regulations were dealt with by the Aeronautics Branch of the Department of Commerce during the third quarter of 1930, according to a recent announcement of Gilbert G. Budwig, Director of Air Regulation. The total violations of the regulations during this period represented an increase of 101 over the second quarter of 1930.

Personnel Changes Announced By Curtiss-Wright Corporation

C. S. "CASEY" JONES, formerly president of the Curtiss-Wright Flying Service, has been promoted to vice president of the Curtiss- Wright Corporation in charge of all public relations.

Major E. H. Brainard, formerly vice president and general manager of the Curtiss-Wright Flying Service, has been appointed president to succeed Mr. Jones. William F. Carey, president of the Curtiss-Wright Airports Corporation, has resigned following the completion of the construction program involving his knowledge of engineering in the company's chain of flying fields. He is succeeded by Charles W. Loos, a vice president of the Curtiss-Wright Flying Service.

Bruce G. Leighton has been made a vice president of the following three subsidiary companies in the Curtiss-Wright Corporation: Keystone Aircraft Corporation, Wright Aeronautical Corporation and Curtiss Aeroplane and Motor Company.

Gliders To Be Eligible For Licenses Under Three Groups

GLIDERS will be licensed by the Aeronautics Branch of the Department of Commerce under three classifications beginning January 1, 1931, according to a recent announcement of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. This date has been extended from October 1 to give manufacturers more time in which to obtain Approved Type Certificates for their products.

The new method of licensing gliders was reported fully in the July, 1930 issue of AERO DIGEST.

Daniel Guggenheim

DANIEL GUGGENHEIM, patron of aviation, died at his home, Port Washington, L. I., September 28. His philanthropic activities were numerous, covering education, aviation and medicine, but among these aviation was the greatest beneficiary.

He created in the name of his son the Daniel Guggenheim Fund for the Promotion of Aeronautics, and during the three years of the existence of this fund, actively directed by Harry F. Guggenheim, between $5,000,000 and $6,000,000 were spent to promote and develop safe flying.

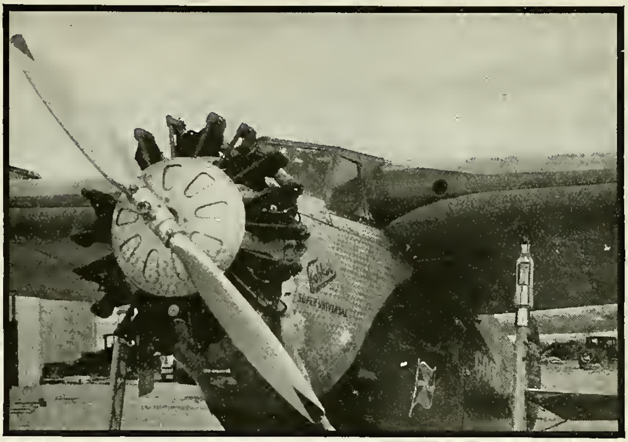
New Junior Coast-to-Coast Records

TWO new junior transcontinental records were established in October by Bob Buck, 16-year old pilot. Buck's time of twenty-eight hours and thirty-three minutes for the East-West flight from Newark, N. J., to Los Angeles, Calif., constituted a new junior coast-to-coast record, breaking the former mark of twenty-nine hours and forty-nine minutes set by Eddie Schneider. Buck completed the return journey to Newark in twenty-three hours and forty-seven minutes, a new West-East junior transcontinental record.

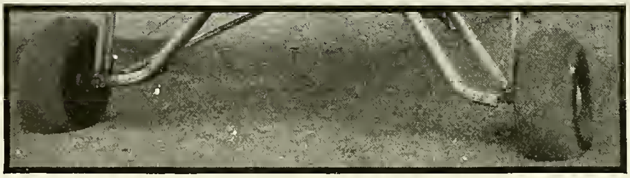
THERE were 14,425 airplane pilots holding licenses issued by the Department on October 1, 1930, according to a recent announcement of the Aeronautics Branch of the Department of Commerce. There were 977 gliders, 118 glider pilots, and 8,979 mechanics licensed, and 8,893 aircraft.

P. & A. Photo

Mrs. Keith Miller landing her Eaglerock Bullet at Los Angeles, setting a new East-West transcontinental record for women.



A COMBINATION SAFETY FEATURE

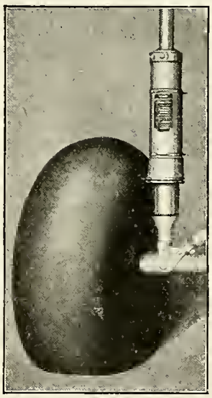


NEVER BEFORE ATTAINED.......

THERE has been considerable discussion of the effect of Air Wheels on the use of Aero Landing Struts. The Cleveland Pneumatic Tool Company has recommended the use of both in combination ever since the Airwheel became a proven unit.

Support of this recommendation is found in the experience of the Goodyear Tire and Rubber Company, which uses a Challenger Robin and a Fokker Super-Universal in testing and demonstrating Airwheels and Airwheel brakes.

Both of these ships are equipped with Aerol Struts and Airwheels and give about as near perfect landing as can be imagined.



The combination of the Airwheel and the Aerol Strut makes it practically impossible to make a poor landing, as the ships stay on the ground under every landing and taxiing condition conceivable.

Such a combination should be extremely favored by airplane manufacturers and users, as it provides a safety feature never before attained, together with slower landings and smoother taxiing under all conditions, and is an important factor in the maintenance and up-keep of the ship.

There is a type and size of Aerol Strut for every airplane. Aerol Struts are manufactured by The Cleveland Pneumatic Tool Company, Cleveland, Ohio.

AEROL *shock absorbing* STRUT

Harry L. Russell, winner of the National Air Tour, and the Ford trimotor which he piloted to first place

NATIONAL AIR TOUR RESULTS

FINAL results of the National Air Tour of 1930 indicate that this event was one of the most successful in the six years' history of the annual competition for the Ford Reliability Trophy. The eighteen planes which started the tour were present at the finish after a flight of approximately 4,900 miles through Canada and the United States, accomplished under varied and extreme conditions of temperature.

The purpose of this year's tour, as in previous contests for the Ford Trophy, is the development of improved aircraft design, and demonstration to the general public of the progress accomplished in making planes safe, efficient and reliable.

A new method of scoring was inaugurated this year. For the first time, this formula placed importance on speed, as well as reliability in determining the winners in the National Air Tour.

Flying a Ford trimotor transport, Harry L. Russell was both first over the finish line and first in the number of points. Previous to this year, the race had been won by the Waco Aircraft Company which placed first in 1928 and 1929. A win this year would have given the Waco Company permanent possession of the Edsel Ford Reliability Trophy.

Russell scored 58,575.6 points, winning first place and the Trophy. John Livingston, flying a Waco, was second; Art Davis took third place with a Waco; and Myron E. Zeller, flying a Ford trimotor, was fourth.

This year for the first time, the Great Lakes Trophy was awarded. This Trophy donated annually by the Great Lakes Aircraft Corporation, is offered to the plane with an engine displacement of 510 cubic inches or less, which has the highest score under the system of scoring by the tour formula. Eddie Schneider, former junior cross-country champion and youngest pilot on the tour, won the first Great Lakes Trophy over four contestants. He placed eighth in the number of points scored by pilots competing in the tour.

Twenty-seven cities were visited by the National Air Tour of 1930 which started at Detroit, Michigan, September 11, and finished at Detroit, September 27. Capt. Frank Hawks was referee and Ray Collins was manager.

Plans for the Air Tour of 1931, including the route to be followed and the formula to be used, were discussed at a luncheon at the Leland Hotel, Detroit, held shortly after the tour. William B. Mayo, chief engineer of the Ford Motor Company, presided over the luncheon which was attended by the personnel of this year's tour. Recommendations from manufacturers will be solicited, it was decided, before definite plans for organizing the next tour will be made.

Number Airplane	Pilot	Engine	Horsepower	Gross Weight	Weight Empty	Useful Load	Unstick Time	Stick Time	Total Points	Average Speed
6. Ford	H.L. Russell	2 Wrights 1 Wasp	1,020	12,910	7,280	5,630	11.58	11.46	68,575.6	131.9
2. Waco	J. Livingston	Wright	240	2,600	1,369	1,241	6.83	5.03	55,628.2	148.3
4. Waco	Art Davis	Wright	240	2,600	1,359	1,241	7.13	5.03	55,226.0	148.4
5. Ford	M.E. Zeller	3 Wasps	1,260	13,600	7,600	6,000	10.70	12.80	65,016.2	147.9
13. Bellanca	George Haldeman	Wright	300	4,600	2,290	2,310	14.05	9.06	53,830.3	139.1
9. Curtiss Kingbird	W.H. Beech	2 Wrights	600	6,115	3,877	2,238	7.87	11.27	53,794.8	131.8
14. Bellanca	J.W. Smith	Wright	300	4,300	2,363	1,937	13.30	8.50	47,648.7	133.5
21. Cessna	E. Schneider	Warner	110	2,260	1,225	1,035	13.03	11.80	47,488.0	113.1
3. Travel Air	T.T. Wadlow	Wright	300	4,427	2,707	1,720	14.32	10.06	42,976.3	132.6
23. Waco	Lee Bowman	Kinner	125	1,911	1,171	740	7.73	5.55	42,742.9	111.3
8. Ken Royce	J.B. Story	Continental	165	2,359	1,447	912	8.87	7.42	41,504.7	119.3
48. Monocoupe	B. Stevenson	Lambert	90	1,490	859	631	10.80	7.38	39,255.5	103.2
1. American Eagle	L. Ruch	Continental	166	3,008	1,875	1,133	14.26	8.13	37,710.8	101.4
22. Kitty Hawk	Nancy Hopkins	Kinner	90	1,875	1,107	768	9.60	15.45	36,528.0	92.9
11. Cabinaire	W. J. Carr	Wright	165	2,630	1,620	1,010	11.56	8.56	35,887.2	104.9
30. Great Lakes	C.W. Meyers	Cirrus	95	1,680	1,012	568	13.50	11.26	33,905.4	106.0
17. Mercury	H.C. Mummert	LeBlond	90	1,513	935	578	11.58	17.37	30,130.2	95.6
19. Sikorsky Amphib.	George Meissner	Wasp Jr.	300	3,700	2,555	1,145	11.52	9.79	27,899.6	94.8

Tabulation of complete official results of the 1930 National Air Tour

Oklahoma Air Tour Postponed

POSTPONEMENT of the Oklahoma National Air Tour, scheduled this fall, until next spring, was recently announced by William B. Estes, manager of the Oklahoma State Chamber of Commerce, one of the sponsors of the tour. The tour is being delayed because of the senatorial and congressional campaigns being waged. Tentative plans had called for the start of the tour at Washington, D. C., visiting thirty-six states with the various governors and other public officials participating.

Regional Aviation Conferences Scheduled Throughout Country

WITH the first two of a series of regional aviation and traffic conferences completed in September at Philadelphia, Penna., and Boston, Massachusetts, six additional conferences are scheduled at various points in the United States during November and December, sponsored by the U. S. Chamber of Commerce.

The Middle Atlantic States' meeting was held at Philadelphia, September 23-24, and that of the New England States took place at Boston, September 25-26. Various problems concerned with the development of aviation and the formation of definite policies were discussed by the representatives of commercial and civic organizations attending the conferences. Among the measures passed by the Philadelphia conference were the extension by the Government of its flying weather reporting service, and endorsement of State legislation permitting the use of all waterways by aircraft. At the Boston, conference, recommendations made include the following: uniform State aeronautical legislation conforming with Federal regulation; enforcement of the Air Commerce regulations by States; adoption of uniform rules by all airports; adequate air markings throughout the country; and exemption of aircraft fuel from State gasoline tax.

The other regional conferences are scheduled as follows: Chicago, November 5-6; Minneapolis, Minnesota, November 7-8; Atlanta, Georgia, November 19-20; Dallas, Texas, November 24-25; Portland, Oregon, December 5-6; and Denver, Colorado, December 8-9.

BOEING Airplane Company has announced a reduction of $2,000 in the price of Model 40-B4 mail-four passenger Hornet-powered plane, the new sale price being $22,-500.

A. C. C. PREPARES AVIATION CODE

AVICO, a new telegraphic code for aviation, has been announced by the Aeronautical Chamber of Commerce of America, to reduce foreign and domestic telegraphic expenses of aviation companies and to provide secrecy in the transmission of these messages. The growing export business of the American aircraft industry throughout the world prompted the Aeronautical Chamber to begin preparation of the code a year ago. Months of study by experts within the industry and conferences with officials of the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce, Department of Commerce were necessary to complete compilation of the new code.

Avico contains 30,000 words and phrases, which include the listing of manufacturers' names, specifications of aircraft and engines, parts and parts assemblies, installations, export terms on shipping, boxing, price quotations and similar types of terms used in export communications.

Aeronautics Branch Awards Contracts for Airway Work and Equipment

CONTRACTS totaling $106,751.59 were awarded recently by the Aeronautics Branch of the Department of Commerce for equipment and work on the airways.

A contract for eighty radio marker beacons and ten sets of spare parts, to cost $59,951.14, was awarded to Charles R. Speaker and Company., Washington, D. C. The Westinghouse Electric and Manufacturing Co., Washington, D. C., received a contract for 250 airway 18-inch course lights, at a cost of $14,437.50.

Contract for fencing six intermediate landing fields on the El Paso-Forth Worth airway, between El Paso, and Wink, Tex., was awarded to S. D. Morris, El Paso, Tex., for $6,849. Clark and Estes, Monahans, Tex., were awarded the contract for clearing, grading and conditioning these fields. The contract price was set at $18,173.50.

Fairbanks, Morse and Company, Baltimore, Md., contracted to furnish a Diesel electric power plant which will be held in reserve for the operation of the radio range station on the intermediate landing field at Medicine Bow, Wyo. Its cost will be $7,340.45.

In addition to these recent contracts, the Aeronautics Branch has expended more than $30,000 since the first of the present fiscal year for the grading, conditioning, clearing and fencing of intermediate landing fields.

Committee on Airport Drainage and Surfacing Organizes Extensive Coöperative Program

THE program of the Committee on Airport Drainage and Surfacing, representing the American Engineering Council, the American Road Builders Association and the Aeronautics Branch of the Department of Commerce, has developed into one of the most extensive series of coöperative studies ever undertaken by American engineers on a nation-wide basis, according to a recent announcement of Harry H. Blee, Director of Aeronautic Development of the Aeronautics Branch and chairman of the committee.

Eighty-seven local engineering committees, representing a total of 450 engineers located throughout the United States, have been organized to work in coöperation with the committee in the study of problems involved in providing adequate drainage and surfacing for airports. Thirty additional local committees, composed of outstanding engineers in the community, are being prepared.

Colorado Utilities Commission Makes Decision Affecting Airplane Transportation

A DECISION affecting airplane transportation has been handed down by the Colorado Public Utilities Commission, which recently granted a certificate to operate between points in Colorado to the Pikes Peak Air Commerce, Inc., and denied the application of the United States Airways, Inc.

The Pikes Peak company filed an application to operate between Durango and Denver via Alamosa, Pueblo and Colorado Springs and between Grand Junction and Alamosa. The United company requested permission to operate between Denver, Salida, Gunnison, Montrose, Delta, Grand Junction and intermediate points. The commission ruled that there is not enough airplane business between Grand Junction and Denver to warrant the operation of two lines between those cities and that only one certificate should be granted.

The Commission found from the evidence that the proposed service of the Pikes Peak company would be of greater value to the people of Colorado than that of the United States Airways.

1931 International Aircraft Show To Be Held At Detroit, Michigan

THE International Aircraft Show of 1931 will be held at Detroit, Mich., April 11-19, sponsored jointly by the Aeronautical Chamber of Commerce of America, Inc., and the Aircraft Bureau of the Detroit Board of Commerce. The event will, for next year, replace the annual All-American Aircraft Show which has been staged in Detroit for the past three years. This will be the only authorized aircraft show in 1931 which will be national in scope.

Roger Williams Joins Emsco Company

ROGER Q. WILLIAMS has been appointed chief pilot and a member of the engineering department of the Emsco Aircraft Corporation, Downey, Calif. Mr. Williams has been engaged in the aeronautical industry since 1917 and has been associated in the development engineering departments of the Bellanca Aircraft Corporation, General Airplane Company, Columbia Air Liners, Inc., and the Uppercu-Burnelli Aircraft Company. Mr. Williams made a trans-Atlantic flight from Old Orchard, Maine to Santander, Spain, and then to Rome, Italy in 1928 in forty-one hours.

CHARLES L. LAWRANCE, designer of the Wright Whirlwind engine, recently announced the organization of the Lawrance Engineering and Research Corporation of New York City. He will remain a vice president and director of the Curtiss-Wright Corporation.

Ten-Day New Business Record

THE Detroit Aircraft Corporation reports new business booked during the ten-day period from September 10 to 20 as the best for any similar period in the history of the company. Gross sales totaled $91,705, which is eighteen per cent more than any other ten-day period excepting those in which Government contracts have been obtained, according to Karl S. Betts, sales manager. Orders on hand September 15 amounted to $909,460. The report lists sales of eleven ships, including five Lockheeds.

THE Irving Air Chute Company recently received an order for 500 parachutes from Yugoslavia. This is the second order of this size received from this country and marks the adoption of the Irving Air Chute as standard equipment for Yugoslavia.

AIRCRAFT AND ENGINE PRODUCTION

Sales Exceed Production in August—247 Aircraft Produced by 61 Manufacturers—379 Commercial and Military Engines Turned Out

TWO hundred and forty-seven commercial and military airplanes were produced during August by sixty-one manufacturers reporting to the Aeronautical Chamber of Commerce of America, Inc. A total of 273 planes were sold during the month. August production and sales remained at about the July level, sales exceeding production in August.

There were 198 commercial airplanes manufactured during August with a total value, without engines, of $756,604.20. In July 183 commercial planes were built. Deliveries of commercial airplanes in August totaled 217 units with a value, less engines, of $945,791.30.

Military airplane production in August totaled forty-nine units with a value of $1,054,638.90, without engines, as compared with sixty-three units in July. Deliveries of military airplanes on contract slightly exceeded production with a total of fifty-seven, valued at $776,000.90 without engines.

Twenty airplane engine manufacturers reported the production of 379 commercial and military powerplants in August, having a value of $1,718,210. Deliveries during the same period totaled 431, with a value of $1,778,500, a substantial increase over July.

Commercial engine production in August totaled 155 units. Deliveries totaled 203 units. Military engine production increased twenty-five per cent over July with a total of 224 units, valued at $1,228,000. Military engine sales closely followed production with a total of 228 units valued at $1,244,125, an increase of twenty-seven per cent over July.

Pratt and Whitney Announce Personnel Changes

CHANGES in the executive personnel of the Pratt and Whitney Aircraft Company, East Hartford, Conn., due to the growth and expansion of the company and the United Aircraft and Transport Corporation, of which it is a subsidiary, were announced recently by F. B. Rentschler.

Don L. Brown, formerly vice president in charge of manufacturing, will become president of the Pratt and Whitney company, succeeding Mr. Rentschler, who will become chairman of the board of directors. George J. Mead, vice president in charge of engineering, has been made head of a newly organized experimental and research division of the United corporation and will be chairman of the executive committee of Pratt and Whitney.

A. V. D. Willgoos, chief engineer, as in the past, heads the engineering staff and will have charge of all engineering activities, assisted by L. S. Hobbs, research engineer, and T. E. Tillinghast, executive engineer.

C. W. Deeds was elected vice president of Pratt and Whitney. J. F. McCarthy, comptroller for the United corporation, was elected to succeed Mr. Deeds as treasurer of Pratt and Whitney. Mr. Deeds continues to serve as secretary and treasurer of the United corporation.

American Legion Air Meet Held at Boston Municipal Airport

MORE pilots and planes than ever before in the history of the Boston Municipal Airport, East Boston, Mass., were present either as visitors or competitors in the various events when the American Legion Air Meet was held throughout the entire week of October 4-11. The airport was the scene of constant activity during the eight days of the celebration.

Both civilian and military pilots participated in the aerial parades, formation flights, acrobatics, parachute jumps and competitive aerial events, which comprised a greater part of the program.

Sets New World Speed Record

A NEW international speed record for planes carrying a load of 2,000 kilograms (4,409.24 pounds) over a 100-kilometer course was apparently established at Detroit, Mich., September 29, by Leroy Manning, chief pilot of the Ford Motor Company, who traveled at a speed in excess of 157 miles per hour. The former record believed to have been broken is 142.66 miles per hour. The flight, made from the Ford Airport to Milan, Mich., and return, was observed by a representative of the N. A. A.

Elect Officers of A. S. M. E.

ELECTION OF OFFICERS of the American Society of Mechanical Engineers for 1931 has been announced.

The new officers of the society are as follows: Roy V. Wright, president; William A. Hanley, Thomas R. Weymouth and Harvey N. Davis, vice presidents; and W. L. Batt, H. L. Doolittle and H. J. Whittemore, managers.

COMING AERONAUTICAL EVENTS

November 5-6 Regional Aviation Conference, Chicago, Ill.

November 7-8. Regional Aviation Conference, Minneapolis, Minn.

November 19-20. Regional Aviation Conference, Atlanta, Ga.

November 24-25. Regional Aviation Conference, Dallas, Texas.

November 28-December 14. International Aero Show, Grand Palais, Paris, France, auspices of Chambre Syndicale des Industries Aéronautiques.

December 5-6. Regional Aviation Conference, Portland, Ore.

December 10-23. International Congress of Aerial Security, Paris. France.

February 1-20, 1931. First Pan-American Aeronautical Conference, Montevideo, Uruguay.

March 25-27, 1931. Third National Airport Conference, Mayo Hotel, Tulsa, Okla.

April 11-19. International Aircraft Show, Detroit. Mich., sponsored by Aeronautical Chamber of Commerce and Aircraft Bureau, Detroit Board of Commerce.

May 15-31, 1931. International Aero Exhibition, Stockholm, Sweden.

China Permits Free Entry of Airplane Parts

IN accordance with a recent order of the Chinese Department of Customs, all airplane parts and accessories from abroad will be admitted free of duty for a period of five years, according to a recent announcement of the U. S. Department of Commerce.

Chicago-New York Air-Rail Service

ARRANGEMENTS have been completed between National Air Transport and the New York Central Railroad whereby air-rail passenger service will be operated between Chicago and New York in place of that discontinued by Universal Air Lines.

The National Air Transport on October 1 inaugurated an air-passenger service between Cleveland and Chicago in conjunction with the New York Central Railroad, making possible a seventeen-hour trip between Chicago and New York.

Caterpillar Tractor Show

THE second annual Caterpillar machinery and equipment show was held September 25-October 4 at the factory and grounds of the Caterpillar Tractor Company, Peoria, Ill. Approximately $350,000 worth of tractors and equipment was exhibited and demonstrated.

New Jersey Ruling Modified

A MODIFICATION of the rule barring the operation of aircraft on the inland waters of New Jersey was announced following a meeting of the State Board of Commerce and Navigation, Trenton, N. J., October 20. The regulation now states that only Lake Hopatcong will not be open to aircraft as it is too crowded with surface craft and too narrow to permit aerial operations. This prohibition does not extend to other inland bodies of water in New Jersey.

Captain Hawks Sets Two More Inter-City Records

CAPT. FRANK M. HAWKS set two new airplane speed records between New York City and Washington, D. C., October 19. Captain Hawks flew from New York to the Capital in one hour and eleven minutes. On the return trip made a few hours later, he covered the distance in one hour and three minutes. Total flying time, two hours and fourteen minutes; total mileage, 450 miles; average speed first hop, 190 miles per hour; average speed, return journey, 214 miles per hour.

AIR MEET HELD AT TRENTON, NEW JERSEY

AN air meet was held at Mercer County Airport, Trenton, N. J., October 18-19, sponsored by the American Legion Memorial Chapel Association, to raise funds for the erection of the Cathedral of the Air at the Naval Air Station, Lakehurst, N. J. More than 50,000 persons and 200 airplanes visited the airport during the two-day meet, according to representatives of the Legion association.

The program comprised competitive aerial events, including airplane speed races, parachute jumping to a mark and landing to a mark contests. Aerial acrobatics were executed by Lieutenant Alfort J. Williams, formerly of the Naval Air Service, and by Captain Frank M. Hawks in his record-breaking Travel Air Mystery S. Military aerial maneuvers were demonstrated by squadrons from the Army Air Corps, Naval Air Service, Marine Air Service and National Guard aerial units.

In the commercial race open to planes with engine displacement up to 800 cubic inches, Art Davis won first place; George Zinn was second, and Marjorie Doeg was third. This race, which was over a thirty-mile course, was won by Davis with a time of 10 minutes and 49 seconds. A race open to planes with a displacement of 510 cubic inches or less was won by J. W. Smith with T. Little second and R. Mackey third.

Lieut. U. J. Carr, National Guard, won a landing-to-the-mark contest with Mrs. B. Gillies second. A commercial race of twenty-five miles open to OX-5 planes only was won by S. M. Snyder at 110 miles per hour. M. E. Grezmerg won the free-for-all speed contest; Russell Shaw was second and Morgan Hardy was third. The winner received $300 and a trophy. A parachute jumping to the mark contest was won by R. D. Rae; R. Taylor was second and J. Horning third.

NEW JERSEY

[F. L. Fitzpatrick]

NEWARK'S city commissioners have confirmed a two-year lease with the New York-Philadelphia-Washington Airway Corporation. The lease will expire in 1933, with renewal option, and requires that the operating company pay twenty-five cents for each passenger carried, a cent for each pound of express carried, and ten per cent of the gross revenue for chartered planes. The lease provides space for three planes in the municipal hangar at $65 per month each.

THE Burlington County Aero Club plans to acquire additional land adjacent to the present field at Moorestown for the erection of a larger hangar at a cost of about $5,000.

JACK BAETOW, manager of Wings Corporation, Camden, has opened a glider school at Five Points, near Philadelphia. There are about twenty-five pupils enrolled.

Chileans Trained at Curtiss Plant

CHILEAN students were trained recently at the Curtiss factory in Buffalo in preparation for work in the newly opened Curtiss-Wright factory in Chile. In the accompanying photograph they are as follows:

Left to right, standing, last row—Chas. Matoon, employment mgr.; Roy M. Hall, in charge of Chilean detail. Manuel Luengo, Carlos Yrigoyen, Juan Biskupovic, Guillermo Conrads, Arturo Molina, Rual Fajardo, P. N. Jansen, factory manager.

Second row standing: Armando Lopez, Rosendo Celedon, Bernardo Soto, Teobaldo Diaz, Ramon Zamorano, Camilo Carrasco, Max Flores.

Front row kneeling: Carlos Larrain, Luis Romo, Alfonso Foucaut, Carmelo Giunta, Enrique Riveros, Carlos Contreras.

MARYLAND

[E. W. Walsh]

Seek Additional $2,500,000 for Airport

BALTIMORE will be called upon in the November election to approve or disapprove an additional loan of $2,500,000 for its municipal airport. The enabling act authorizing this loan was passed at the 1929 session of the Maryland Legislature, the Legislature in 1927 having passed an act authorizing a loan of $1,500,000 for the construction of an airport. This amount was found to be insufficient, as the present estimated cost of the municipal airport is approximately $4,000,000. The bulkhead has been completed. Some 6,500,000 square yards of soil are in place. An additional fill of 5,000,000 or 6,000,000 square yards will be necessary to complete the project.

AN AVIATION committee, organized for the purpose of formulating plans for the promotion of interest in aeronautical activities in Baltimore, was appointed by the Baltimore Association of Commerce. Glenn L. Martin, president of the Glenn L. Martin Company, aircraft manufacturers, was named chairman of the committee.

THE B-J Flying Club, Inc., has been incorporated under the laws of Maryland for the purpose of organizing a flying club and school. It will have no capital stock. The incorporators are William H. Miller, assistant chief engineer of the B-J Aircraft Corporation; William Wait, Jr., and Theodore Elliott. When the club is well organized flying equipment will be purchased.

OHIO

[T. E. Lunsford]

THE City Council of Bucyrus, Ohio, has approved a bond issue of $15,000 for the purchase of a site for an airport in that city.

INCORPORATION papers have been issued to the Air Transport Exchange Co., Youngstown, Ohio. The company is capitalized at $25,000. The incorporators are J. Ralph Seidner, L. L. Lundgreen, Charles Towne, David Wolfgang, Maurice Ragosin and Samuel Ray Ragonsin.

AIR Services, Inc., Akron, Ohio, in coöperation with Baker-McMillen Co., glider manufacturers, opened classes for glider pilots at the Akron Municipal Airport October 20.

GLIDER enthusiasts of Piqua, Ohio, will form a club in that city in the very near future, and purchase a glider for the use of the club from the Waco Airplane plant at Troy. Don Flower, glider expert from the Waco Airplane plant, recently delivered a number of addresses on gliding at Piqua.

COLUMBUS

[W. Donald Walter]

NORTON Field ships were missing from their hangar on two successive weekends recently. Lieutenant McConnell flew the O2-H and three Cleveland Reserve pilots piloted the PT's to Cleveland for the use of the Air Corps Reserve unit in that city. Over the preceding week-end, Lieutenant Sam Sharp in the O2-H, with Director of Aeronautics John M. Vorys as passenger; Major Centner, accompanied a regular Army officer in a PT; and Lieutenants Al Harter and Ross Aukerman in a PT, flew to Cincinnati to attend the dedication of Lunken Airport.

NORTON FIELD has turned in its O-11, and an O2-H has been issued in its place. Needless to say, this trade meets with the enthusiastic approval of all Air Corps Reserve Officers at this station. We are hoping to obtain another service type ship in the near future.

FRANKLIN Post No. 1 of the American Legion, recently held a meeting at Port Columbus. A ship was chartered by the Post from the Curtiss-Wright Flying Service, for the use of members during the afternoon and evening, but a high and extremely gusty wind hampered flying operations. Dinner was served in the Curtiss-Wright hangar, followed by the regular meeting. After the meeting, members were addressed by Major Centner, superintendent of the port; Lieutenant McKee; and John M. Vorys, State Director of Aeronautics.

PENNSYLVANIA

ONE of the first flying schools in the United States to organize a woman's division was the Penn School of Aviation, a subsidiary of Pittsburgh Aviation Industries Corporation, Pittsburgh, Pa.

The woman's division of Penn School has been in successful operation for more than six months. Ground and flying courses are given, the ground courses having proven more popular because of their low cost. Through an affiliation with the University of Pittsburgh, downtown division, Penn School offers a basic ground course and an aviation business course. Classes meet for two hours, two nights a week for seven weeks.

PHILADELPHIA

[R. Gard]

THE Wings Corporation, local Waco distributors, recently opened a new field, which is now being used for glider instruction. The new airport, called Wingsport, is located on Stenton Avenue. A hangar has been built to house the gliders.

(*Continued on next page*)

Chilean students at the Curtiss factory in Buffalo, N. Y., for training in preparation for work at the company's South American plant

(Pennsylvania News Continued)

IN ORDER to familiarize Philadelphia pilots with the performance of the autogiro, a tour of five airports in the district was made recently.

Two autogiros, each powered with 225 horsepower Wright engines, took part in the demonstration trip. They were flown by J. Ray and Faulkner of the Pitcairn company.

The fields visited in the tour included the Philadelphia Airport, Central Airport, William Penn Airport, Somerton Airport and Patco Field.

ON OCTOBER 17, the Aero Club of Pennsylvania began a series of eight lectures on aviation in the Engineers' Club. Each of the eight lectures will be devoted to a phase of aviation.

A RESOLUTION urging that Mayor Mackey and the City Council authorize a special election on the question of transferring $5,000,000 from a $70,000,000 fund, allotted for various civic improvements, to complete the Hog Island Airport, has been presented to the Southwest Philadelphia Chamber of Commerce.

KENTUCKY

[A. W. WILLIAMS]

THE Louisville and Jefferson County Airboard re-elected the following officers at a meeting held October 15: Addison W. Lee, Jr., general manager of the Louisville Gas and Electric Company, chairman; Frank D. Rash, vice chairman, and Roger E. Schupp, secretary.

At the meeting it was announced that $2,500 would be spent for the installation of floodlights on the top of the board's administration building at Bowman Field.

The board again tendered to the U. S. Army Air Corps the use of Bowman Field for the annual air maneuvers.

MISSOURI

[M. SHEETZ]

A CONSOLIDATED ticket office has been opened in Kansas City at 1104 Baltimore Avenue. The Airways Ticket Office sells tickets on the following lines: T. A. T.-Maddux; United States Airways; Eagles Airlines; Rapid Air Transport; and the Universal and Southern divisions of American Airways.

THE Kansas City Airport will soon offer increased facilities for take-off and landing with the completion of four runways: east-west; northeast-southwest; north-south; and northwest-southeast.

SHELTON AIRLINES, which suspended operations during August, has resumed service from Curtiss-Steinberg Airport, St. Louis to Columbia, Fulton and Jefferson City.

THE Allton Flying Service, Columbia, has installed an "Aviation Trainer" at the airport to assist in student instruction. The Allton Flying Service is also offering the "Cadet" home study course.

THE Kansas City base of the Curtiss-Wright Flying Service is offering a night course in aviation mechanics, lasting six months with three study periods a week. Graduates of the course will be sent to either of two factories under Curtiss-Wright control, at St. Louis or Wichita.

ST. LOUIS

[T. P. WAGNER]

A FLYING club organized under the National Aeronautic Association plan was formed recently by St. Louis aviation enthusiasts at a meeting at Curtiss-Steinberg Airport.

There will be three types of membership: the first, requiring a $200 initiation fee and $25 annual dues, entitles the member to flying instruction at $7 an hour and to subsequent flying time at a moderate fee (the $200 is invested in flying equipment and the member thus has a financial share in the club); the second type is composed of social members, who pay $25 a year and participate in the affairs of the organization; and the third, comprised of plane owners, who wish to avail themselves of the storage and service facilities of the club and pay $10 a year for the privilege.

THE last material for runways at Lambert-St. Louis Field was laid recently, marking the end of the year's construction program.

WITH the appointment of Kester Lindsay, formerly assistant to Major Brainard, as manager of Curtiss-Steinberg Airport, a definite change of policy is expected. Lindsay succeeds Major James Tully, who opened the field.

The flying school will be reorganized, only hourly instruction being given as students apply. The airport will be available to airline operators, and every effort will be made to attract private plane owners. Skyway Inn, the airport restaurant, will be kept open throughout the winter.

KANSAS

[C. W. PRYOR]

WESTERN AIR SERVICE CORPORATION, Salina, Kansas, has acquired the equipment of the Brower Air Service and taken over its passenger lines and flying schools. The Western company operates Stinson planes between Lincoln, Neb., Omaha, Salina, Wichita and Oklahoma City.

Flying schools at Belleville, Lindsborg and Salina, Kansas and Blackwell, Okla., have been consolidated at Salina, under direction of Gene Lawrence. Seven planes are used exclusively for training, including a Great Lakes Trainer recently purchased.

NEW machinery has been installed in the Travel Air factory, Wichita, Kan., to speed up production.

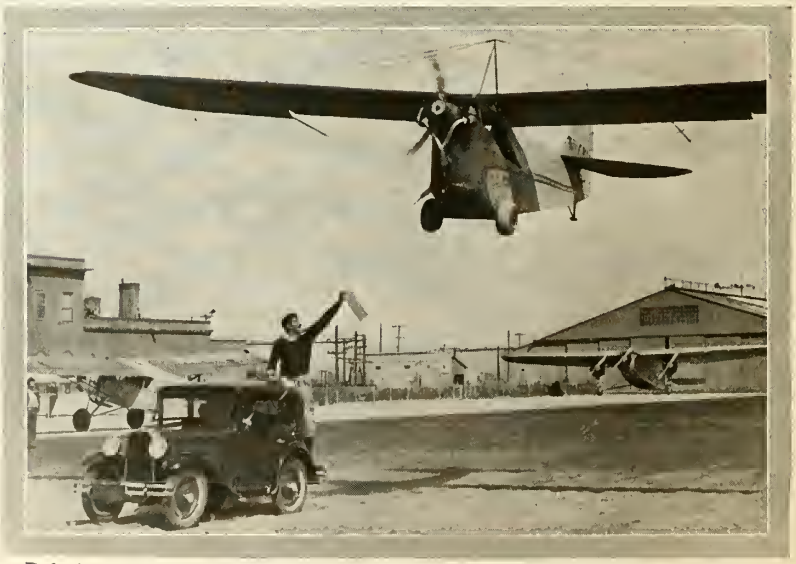
IOWA

[R. W. MOOREHEAD]

ADOPTION of the report submitted by the Des Moines municipal airport committee and condemnation proceedings as a means of acquiring a tract of 240 acres at South West Twenty-first Street and Army Post Road, for airport use, has been voted by the city council.

APPROXIMATELY 125,000 spectators attended the air shows in Iowa during the summer, including those attending the exhibitions of the Iowa Good-Will Air Tour. This includes those persons viewing arrival and departure of planes taking part in the air tour at towns where a regularly sponsored air show was not scheduled.

Towns at which air shows were held and the number of people attending are: Marengo, 8,000; DeWitt, 10,000; Emmetsburg, 12,000; Red Oak, 8,000; Ottumwa, 10,000; Mason City, 8,000; Monticello, 10,000; Oskaloosa, 5,000; Carroll, 15,000; Washington, 5,000; Ida Grove, 11,000; Creston, 3,000 and Denison (estimated), 3,000.



Refueling an Aeronca in flight from an Austin car, a novel stunt recently effected

MICHIGAN

Stinson Advances Price of Two Models

ADVANCES in the selling price of two Stinson models have been announced by the Stinson Aircraft Corporation, Wayne, Mich.

The cost of the Stinson Junior, a four-place cabin monoplane, powered with a 210-horsepower Lycoming engine, has been increased from $5,775 to $5,995. The tri-motor Stinson Airliner, powered with three Lycoming engines, has been increased in price from $23,900 to $25,900.

Szekely 40 h.p. Overhead Engine Completes Endurance Test

A FIFTY-HOUR endurance test has been completed by the Szekely Aircraft & Engine Company, Holland, Mich., at the Bureau of Standards on the three-cylinder Overhead forty-horsepower engine. The company has received Department of Commerce Approved Type Certificate 53 for the Ell-head three-cylinder engine with the rating of thirty-horsepower.

These two engines are now in production. The company plans to submit for test to the Department of Commerce the five-cylinder Ell-head, sixty-horsepower engine, and the five-cylinder overhead type seventy-horsepower engine.

Warner-Scarab Standard Powerplant For Ireland Privateer

THE 110-horsepower seven-cylinder Warner Scarab engine made by Warner Aircraft Corporation, Detroit, Mich., will be the standard powerplant on the Ireland "Privateer," designated Model P-2, which is now eligible for license, having passed the Department of Commerce tests. The ship is made by Ireland Aircraft, Inc., Garden City, New York.

The Privateer is an open-cockpit, two-place monoplane amphibion, with pusher propeller located aft of the cockpit. Ships are now in production.

UNPRECEDENTED passenger and express business during September on the Marine Division of the Thompson Aeronautical Corporation was recently announced by officials. The division operates a mail, passenger and express air transport service over Lake Erie between downtown Cleveland and downtown Detroit. Amphibions are used.

[K. F. ZEISLER]

THE Board of Aeronautics has asked the State to purchase two planes for the board's inspectors, who are continuing their work of licensing and inspecting State fields and schools under the new air code put into effect early this summer by the board.

IN addition to continuing its amphibion service throughout the winter for the first time, Thompson Aeronautical Corporation will inaugurate next spring a new amphibion line between Detroit and Milwaukee.

DETROIT district offices of the Aeronautics Branch of the Department of Commerce have been moved from the Free Press Building downtown to the new Wayne County Airport, where quarters are provided in the new commercial hangar. In addition to the present activities, the office will be augmented with an engineering department which will conduct test flights.

[J. M. HILL]

EFFORTS of the State of Michigan to construct a State airport have again fallen through because of technicalities arising from a clause in the State constitution which limits appropriations for internal improvements to the construction of highways and reforestation projects. Gov. Fred W. Green has announced that, because of the legal tangles, no further attempt to build two concrete runways on the State-owned airport now being used by the city of Lansing would be made this year.

HIGH tension wires near Ypsilanti Municipal Airport, have been removed. The wires were situated along the south edge of landing field.

UPPER Peninsula Airways, at Escanaba, has been re-rated by the Michigan Board of Aeronautics from a transport to a private flying school. The change was made on the request of Harold Westcoat, operator of the school.

CONSIDERABLY more than the $3,000 asked by the Chamber of Commerce of Marshall, Mich., to complete improvement of the Brooks Airport at Marshall was obtained at the conclusion of a drive conducted there.

THE matter of creating a municipal aviation commission for Detroit will be placed before the voters of the city at the November 4 election, following a recent action by the Detroit City Council.

NOTIFICATION that the Manistee Airport has been closed for the winter has been made to airports throughout Michigan by the State Board of Aeronautics. Repairs to the field will be made during the inactive period.

THE Lansing Aviation Club plans the purchase of a plane for training purposes.

WISCONSIN

[W. SCOLLARD]

THE Fondy Flying Fraternity has been organized at Fond du Lac by six initial members. They are as follows: Victor Heath, Pat Cotter, Walter Gehde, Wilbur Moersch, Jerry Keyes and Joseph Wiedenmeier. The organization has purchased a Pheasant biplane and has engaged S. J. Wittman as instructor.

SIX of forty Wisconsin airports planned by the National Skyriders, a Wisconsin-Minnesota organization of airplane pilots under the direction of the American Legion, have been established thus far, according to Lieut. Edward P. Shurick, commander of the Skyriders. Airports which have been established are at Stanley, Shawano, Athens, Princeton, Waupaca and Poynette. Base 38 was formally opened on October 18 with an air meet.

ARTICLES of incorporation have been filed by the Badger Airways of Milwaukee, Wis. The company will deal in airplanes and has been authorized to issue 500 shares of stock at no par value. Signers of the article are T. B. Towle, A. Boedecker and H. F. Towle.

MINNESOTA

[H. A. LINDBERGH]

THE national defense committee of the Chamber of Commerce in its recent annual report recommended the establishment of a Naval Reserve seaplane base and an Army Air Corps Reserve Squadron with hangar and equipment at the Williamson-Johnson Municipal Airport, Duluth.

DURING the past year the board of St. Louis County Commissioners appropriated $20,000 for the Williamson-Johnson Municipal Airport. However, C. E. Adams, special counsel for the board, recently notified the members in a written opinion that county aid in the improvement and maintenance of municipally owned airports cannot be undertaken. This ruling will create a financial tangle not only in Duluth, where the city proceeded with improvements with the understanding that county funds would be available, but also in other communities in St. Louis County as well.

MAX CONRAD, JR., operator of the Conrad Flying Service of Winona, Minn., has announced plans to operate an airline from Virginia, Minn., to Southern Minnesota cities. Dannie Fowlie will be chief pilot.

NEBRASKA

[J. R. LOWELL]

IMPROVEMENT of the new hangar at the Hastings Municipal Airport has progressed to the stage where a concrete floor has been laid and a new pressure water system, capable of delivering 1,000 gallons of water per minute, is being installed by the City Engineer to provide fire protection. The rough work is all in for sewer and water connections inside the building, and the office rooms have been completed. Future plans include the laying of a concrete apron, seventy-five feet by 200 feet, at the approach to the hangar, work to be done next spring; and the installation of a larger concrete well near the hangar for water storage to take the place of the well already in use. Harry Wimer is airport manager.

THE Ainsworth Commercial Club will be on the market next spring for a hangar, and other improvements which will be made on a 141-acre field, one mile from the town.

(Continued on next page)

(Nebraska News continued)

PLANS for an airplane tour by executives of the Nebraska American Legion have been completed. The plane will land in each district of the State and gather memberships of the district, both for the Legion and its auxiliary, to be brought to Lincoln November 1.

STATE officers were permanently enjoined in a decree signed by District Judge Chappell at Lincoln, from attempting to collect the State's four cent gasoline tax on motor fuel used by the Boeing Air Transport, Inc., in its planes engaged in interstate commerce. A temporary injunction had been granted previously until the case could be decided.

DRAINAGE improvements and runway extensions to cost approximately $10,000 are being pushed through this fall at the Lincoln Municipal Airport. The drain pipe used will vary from six to ten inches in diameter and there will be approximately 3,700 feet in all.

WORK on the hangar at Hapgood airport at York was recently completed. The building is forty feet by sixty feet and sixteen feet high. The floor is concrete. A gasoline pump operated by electricity is connected with the hangar. The hangar will be used by the York Air Service recently organized by Howard Schultz and Yale Chapin.

OMAHA

[C. P. RODMAN]

THAT Omaha will have a second airport now seems assured. The field will be located five miles south of the Omaha postoffice near Bellevue. Preliminary surveys have been made and actual development is scheduled to begin in the near future.

A survey of the site and the plans for development were approved by W. J. MacKenzie of the Department of Commerce.

THE city council of Omaha has asked the voters to grant the privilege of issuing bonds in the amount of $100,000 a year for the next five years for further improvement of the municipal airport.

OKLAHOMA

[F. E. SCHOFIELD]

THE airport at Durant was dedicated November 11.

PATRICK J. HURLEY, Secretary of War, participated in the dedication of the new Stillwater, Okla., airport October 13. The airport land has been purchased by the city at a cost of $13,000 and consists of 240 acres about two miles north of A. and M. College.

CLAUDE E. AIKAMAN, Gladys J. Aikaman and W. J. Armstrong have incorporated the National Aircraft, Inc., in Oklahoma City for $5,000 authorized capital stock.

DEDICATION of the airport at Perry was held October 5. Stunt flying and racing completed the program. Charles Tucker is port manager. The field has a runway 2,000 feet in length and 500 feet in width.

TEXAS

[C. MORRIS]

THE Texas Aero Corporation of Temple will move its repair shops to Fort Worth municipal airport as soon as the City of Fort Worth completes the erection of a $20,000 structure to be leased to that company for fifteen years.

CHARLES SMOOT, JR., and Roy Hundley plan to establish a flying school at Denton, Texas, using a Travel Air.

A SCHOOL of instruction in night and day flying and air navigation was opened October 1 by Johnson-Britton Flying Service, McAllen, at the McAllen-Higalgo Airport.

JACK L. ECHOLS, in charge of a flying school in Harlingen, plans the establishment of a landing field and flying school at Mission.

A GROUND school course in aviation is being offered school-boys at Corpus Christi under the instruction of W. C. Maus, vice president of Southern Academy of Aeronautics. There will be no charge except for textbooks.

AN aviation ground school is included in the high school course at Main Avenue High School at San Antonio.

A FIVE-WEEKS' course of ground instruction is under way in Austin, the course being offered free of charge to Austin citizens by R. B. Dockard, manager of the John D. Miller Aerial Service at Robert B. Mueller municipal airport.

MEXIA Aircraft Company, Mexia, Texas, has been organized with Jack Kirk as manager and pilot. Capital is $4,000. A Ryan cabin monoplane will be used.

TYLER FLYING CLUB, Tyler, Texas, organized recently by O. C. Palmer, manager of Tyler Municipal Airport, plans the purchase of two planes.

THE Chamber of Commerce, Goose Creek, plans the improvement of 300 acres recently acquired for the development of an airport.

AIR TAXI COMPANY, Athens, Tex., capital, $2,000, has been incorporated by H. A. Drane, C. I. Shelton and Jack T. Lire.

AVIATION CORPORATION has purchased Delta Air Service, which subsequently discontinued its Dallas-Atlanta line.

ARKANSAS

[F. E. SCHOFIELD]

THE third annual Arkansas air tour was held October 1-3, sponsored by the Little Rock Chapter of the Aeronautic Association. Capt. Robert Baker of the 154th Observation Squadron, Arkansas National Guard, was commander. Lieut. John Howe, of the 154th Squadron, piloted the advance ship. Bert Harper was flight leader with Arthur Stauber as his assistant. Between fifteen and twenty planes made the tour which visited fourteen towns in various sections of the State.

LOUISIANA

[C. F. COCK]

THE East Baton Rouge Parish Police Jury has called for bids for paving work in connection with the construction of the Parish airport at Baton Rouge. Bids will be received until November 10 by Paul Amiss, treasurer. Plans were prepared by A. G. Seifried, Inc., of Baton Rouge. The project consists of 1,945 square yards of concrete asphaltic apron; 218 square yards of concrete circle marker; 316 square yards of concrete walk; 2,600 feet of six-inch tile with cinder backfill; 160 feet of 12-inch tile with cinder backfill, and two concrete catch basins.

BIDS received by the Ouachita Parish Police Jury for a new brick and steel hangar at Selman Airport, Monroe, were considered too high when they were opened October 1. Plans called for a structure 110 feet by forty feet to cost from $12,000 to $16,000. The lowest bid was $24,812.

FORMAL transfer of the 22,000 acre site for the Third Attack Wing of the Army Air Corps in Bossier Parish, across Red River from Shreveport, has been made to the Federal Government. A bond issue of $1,500,000 was voted by Shreveport to purchase the site.

FLORIDA

[J. M. MURRAY]

CHARLES STAUNTON, Department of Commerce inspector, has completed an inspection of the airport at St. Augustine, Florida, and pronounced it to be in exceptionally good condition.

APPROXIMATELY 150 feet of runway has been added to the South Jacksonville air terminal, as a result of the moving of the power line along the west side of the field.

CONTRACT was formally executed October 8 between the Winter Haven Airport, Inc., Winter Haven, and the Nilson-Mueller Corporation, Orlando, whereby the latter company will take over the management of the municipal airport for a period of five years, with an option of renewal for a similar period at the expiration of that time.

CONTACTS

By FRANK E. SAMUELS

ONE of the busiest privately owned airports in the West is situated less than a mile north of Monrovia. It is owned and operated by D. J. Robertson. On a recent trip we made a call at the airport and found over thirty students awaiting their turn for instruction. Three planes with their instructors were being kept busy with students receiving landing and take-off instructions. Short and cross-country flights are specialized in at the airport, in addition to the club and private student instructions. This is a busy and well managed airport.

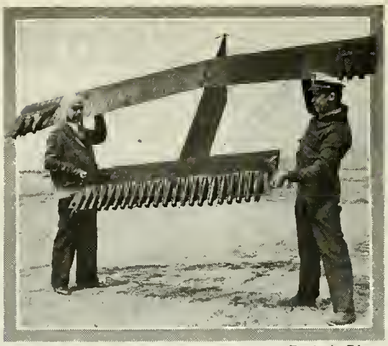
ON A recent call at the Emsco Aircraft plant at Downey, we had the pleasure of meeting Roger Q. Williams, of trans-Atlantic fame, who has lately become affiliated with the Emsco company, as test pilot and consulting engineer. While at the plant, Ted Lungren escorted us through the building, bringing to our attention particularly their latest production, a two-place sport monoplane, powered with a nine-cylinder, 165-horsepower Continental engine.

ANOTHER aviation firm which has recently changed its base of operation is the Spillane Aero Supplies, Ltd., which moved from Los Angeles to the Grand Central Air Terminal, Glendale.

THE latest Los Angeles airport is the new Victory Flying Field, situated on Victory Boulevard, just north of Burbank. The airport is owned and operated by Zitto and Lashbrook, who are specializing in student instruction and short and long distance passenger flights. Their equipment consists of new Waco 10's.

THE Radio Shielding for airplanes, developed by Walter Hamilton of the Aero Corporation of California, has proven so successful that the Western Air Express has ordered 100 sets for installation on mail and passenger planes. It is claimed that the planes which have had the sets installed, have exceptionally good radio communication with no interference in sending or receiving.

TESTS of a flying model of a rocket plane will soon be made, according to M. Poirier, inventor, who is working with Franklin L. Wallace. It will be powered with 38 steel cylinder rockets.



P. & A. Photo

Poirier and Wallace with model of rocket plane they are developing

CALIFORNIA

ALAMEDA

[H. V. WALDORF]

TO KEEP the pilots in good physical trim, a handball court has been constructed at the Curtiss-Wright Alameda Airport by Jack Tuyls, division engineer.

THE Royle and Andrews Flying Service opened a ground school in downton Oakland, October 15. The school is to specialize in twenty lecture courses designed to prepare applicants for flight training. Lieut. Charles Garrels is dean of the school. Captain W. H. Royle heads the list of lecturers.

THE Sorrenti Aviation Corporation, reported capitalized at $1,000,000, has established the first unit of an airplane factory near the eastern boundary of the San Francisco Bay Airdrome. The company plans production of a light two-place plane. S. S. Sorrenti is president and Otto Morgensen, chief engineer.

THE Derby Flying Club, specializing in low-rate flying instruction, has been established at Curtiss-Wright Alameda Airport by Gerald D. Meek.

FIRST unit of the $180,000 yacht harbor at the Curtiss-Wright Alameda Airport was completed October 1. The area, to be used also for a seaplane base, is 2,000 feet long. Initial accommodations are for 150 boats, the completed harbor to handle 350 boats. The remaining units to include a large clubhouse and repair shops and marine garage, are scheduled to be completed before January 1.

OAKLAND

[H. V. WALDORF]

TWO additional offices for the Aeronautics Branch of the Department of Commerce have been constructed in the administration building at Oakland Municipal Airport. Additional room is expected to be required when the airport becomes an official engineering depot for the Department.

OPERATIONS records of the Oakland Municipal Airport during October show 5,795 student landings, 1,451 other than student landings, and 2,476 passengers.

AMENDMENTS to the rate ordinance recently passed for Oakland Municipal Airport provide a fee of $1 for each passenger landed at or taken from the flying field by planes other than those based there; an annual fee of $6 for space for portable garage; a rate of ten cents a square foot for space in the administration building, and three cents a square foot in the leantos adjoining the hangars.

The board of port commissioners is authorized to approve special leases of not less than one year duration for hangar and leanto space exceeding 4,200 square feet.

BEN KLEAVER has established a commercial flying service at Oakland Municipal Airport.

THE Fillmore Flying Service and the Wright Air Service, pioneers at Oakland Municipal Airport, have launched extensive expansion programs. The first move of the programs was to lease Hangar No. 1, which totals more than 20,000 square feet of floor space. The lease covers shop and office space in the hangar leanto.

Both companies operate flying schools, air taxi and sightseeing services. William Fillmore is president of the Fillmore company and W. D. Wright, of the Wright organization.

Conduct Transportation Survey

A SURVEY which has as its objective the establishment of a convenient and swift transportation service to Oakland Municipal Airport, has been launched by the Board of Port Commissioners. It is estimated that more than 100,000 residents of the Greater Oakland area and thousands of visitors have been unable to visit Oakland airport because of the transportation difficulties.

The commission hopes to learn the route and time required by each person in traveling to the airport, the cost of each trip, the desired hours and route of bus service.

FORMATION of a Western glider club association is the object of a series of meetings being held by representatives of twenty Oakland and San Francisco Bay region glider clubs. Weekly air meets are held at Thirty-fifth and Kirkham Streets, San Francisco. Sam Eubanks of San Francisco, has been named temporary chairman of the group of clubs.

REORGANIZATION of the Hurley Flying Service under the name of the Monarch Flying Service has been completed at Oakland Municipal Airport by Dolores Guinther, president of the organization. The company operates an air taxi, sightseeing and instruction service. Other officers are, Andy Johnston, general manager, and Kenneth Neese, chief pilot.

FOLLOWING three years of development work, the Board of Port Commissioners has decided to ask for a Department of Commerce A1A rating for Oakland Municipal Airport. Formal application for the rating has been forwarded to Washington.

SAN DIEGO

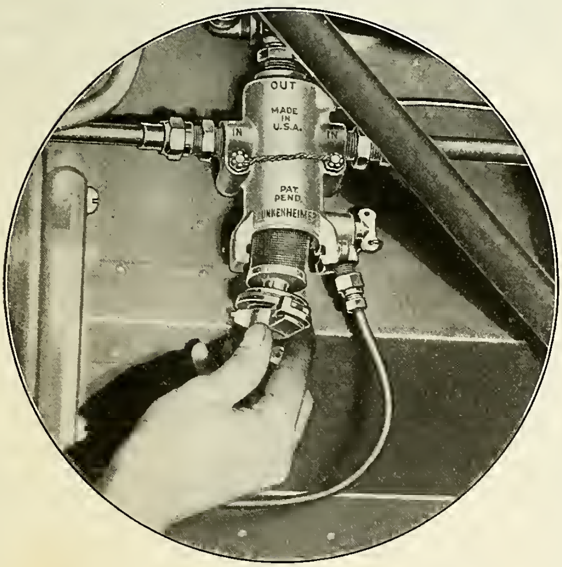
[L. M. EARL]

AIRTECH School of Aviation, San Diego, Calif., celebrated its second anniversary recently, reporting that its planes had flown 1,155,960 passenger miles, spending 6,423 hours aloft, without injury to pilots or passengers. The school has trained

(*Continued on next page*)

LUNKENHEIMER AIRCRAFT SPECIALTIES

ALUMINUM GASOLINE STRAINERS



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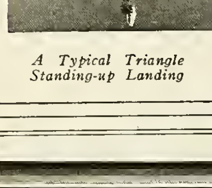
SMALLER . . . lighter . . . stronger! There, in three words, you have a description of the Triangle 23½ ft. parachute. This model was developed in answer to the demand for a parachute with all the superior Triangle advantages—but with less bulk.

The Triangle 23½ ft. parachute weighs less, yet is by far the strongest parachute construction yet developed. It opens quicker; its rate of descent is remarkably slow; it has low opening shock; does not oscillate, and is steerable. Drop testing with 1,200 lbs. of lead has proved the exceptional strength and absolute dependability of this better parachute.



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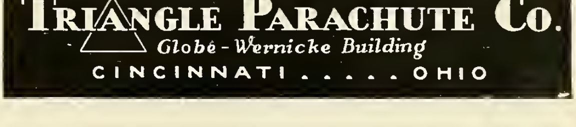


TRIANGLE PARACHUTE Co.
Globe-Wernicke Building
CINCINNATI . . . . . OHIO

(California News continued)
169 students. Its activities have required the use of eighteen planes, ranging in sizes from Fleets to an eight-place all-metal Solar transport plane, with a total value of $120,-200.

AIR-TAXI service, from San Diego to the new $2,000,000 casino and hotel in Ensenada Mex., was inaugurated at Lindbergh Field, San Diego, October 1, by Pacific Scenic Airways, Inc. Headed by Mr. S. B. Smith, the Pacific company has purchased two five-place Ireland Air Yachts, powered by Wright Whirlwind 300-horsepower engines. The San Diego base is located on the bay at the edge of Lindbergh Field, while the Ensenada terminal will be the beautiful Todos Santos bay where a special pier has been erected. The sixty-mile trip is made in thirty to forty minutes as against a four or five hour auto trip. Two round trips daily are scheduled.

ARIZONA

[H. G. Wilson]

ESTABLISHED in its new quarters at Phoenix Sky Harbor, Arizona Air Service, Inc., celebrated its first anniversary in October. The service's first anniversary was passed with the organization's operating facilities representing an expenditure of $250,000. In the past year, sixty-five students have been licensed, six of them as transport pilots.

THE Phoenix Chamber of Commerce in a communication to the city commission has gone on record as favoring the acquisition of Phoenix Sky Harbor by the city for use as a municipal airport. The chamber favors the move providing satisfactory arrangements can be worked out as to the cost of the transaction and disposal of the present municipal airport.

CONSTRUCTION of a hangar at the airport, Douglas, Ariz., is scheduled to be completed November 20. The structure, which will cost $12,190, is 100 feet by 120 feet and will be constructed of steel and sheet metal. The roof and sides will be of corrugated iron. The building will rest on a concrete foundation and the floor will be of concrete, four inches thick.

IDAHO

[G. H. Perrins]

A NEW landing field that will permit planes to land within seven miles of the west entrance to Yellowstone Park is being sought by the State, A. C. Blomgren, State aeronautics engineer, announces. He has inspected the site and pronounced it suitable for an intermediate landing field or for use of planes wishing to bring passengers to the park or to Henry's Lake country on the upper Snake river.

[I. M. Durnin]

A FORCE of men is at work erecting two buildings for the Federal radio station located near the airway landing field at Burley. One is to be for the equipment necessary for operation of a radio beacon, and the other will be a modern residence to be occupied by the operator in charge. Carl Schindler, U. S. Navy, will supervise the new radio station.

WASHINGTON

[C. M. Litteljohn]

THE Gray Goose Airways, Inc., Seattle, was recently incorporated by S. B. Phillips and H. G. Reaber. Capitalization is $2,000.

A PROGRAM of expansion is being undertaken by the Alaska-Washington Airways at Seattle. Two giant fourteen-place Fokker flying boats are being purchased at a cost of $40,000 for the Seattle-Alaska run. Altogether a $100,000-replacement program is being launched by this company.

THE name of the Bergersen-Sherman, Inc., of Tacoma, Wash., has been changed to Tacoma Field Flying School, Inc. The capital stock is being increased from $10,000 to $25,000.

ONE of the largest floating hangars in the world is being constructed at Seattle. This is the new Lake Union terminal of the Alaska-Washington Airways, built at a cost of $15,000. It is the first of five such terminals of the company. Other floating hangars will be at Victoria and Vancouver, B. C., and at Ketchikan and Juneau, Alaska. The new hangar in Seattle will be moored at Lake Union until next spring, when the company will ask the city council to remove its ban on hangars on Lake Washington, and if successful, will build a permanent terminal on the lake.

NORTHWEST

[F. K. Haskell]

STEAM shovels, tractors and graders are hard at work enlarging the thirty acres of Rankin field, Portland, Ore., to 100 acres of level ground on which landings and take-offs may be made in any direction.

Details on the work were given by Tex Rankin of the Tex Rankin School of Flying. Immediately after the leveling work, clover is to be sown. Until the turf becomes firm, the present gravel runway will be used. On completion, the field will afford runway space approximately 3,000 feet long and 1,000 feet wide.

Several floodlights have been installed and boundary lights probably will be put in next year. A small office building is to be constructed this year and school buildings are to be erected in 1931.

SUCCESSFUL flights have been made at Portland, Ore., in the second Student Prince biplane manufactured by the Aircraft Builders' Corporation. Lieut. Basil B.

The Red Wing Aero Club has been organized at Lakeview, Oregon. It is planned to organize additional clubs throughout Oregon.

Smith designed the ship. This is the third Student Prince to be built in this city and the second under the official approval given by the Aeronautics Division of the Department of Commerce.

COMMISSIONER A. J. Fabian at a recent council meeting, Spokane, Wash., stated that plans had been worked out whereby private capital would invest $100,000 in improving the local air field. For immediate improvements the city decided to buy power grading machinery and other equipment, and make a start on putting down pavement. An additional $60,000 is available for improvements early in 1931.

AN aerial photographic mapping service has been organized at Portland, Ore., by Fred Gilham and D. H. Miller. They were formerly connected with the Brubaker Aerial Surveys.

HEADQUARTERS of the Pacific Air Transport Company have been moved from Portland, Ore., to Seattle, Wash., according to announcement of Boeing officials. Les G. Hubble, superintendent of the northern division will hereafter be stationed at Seattle, and Phil Sharp will continue his office in Portland. Lee B. Jamieson will handle the ticket offices at the administration building on the airport.

A REGULAR tri-weekly air passenger service between Portland and Eugene, Oregon, including stops at Salem, Albany and Corvallis was launched October 4 under the supervision of Lee U. Eyerly.

IT is now found necessary by the pilots of the Seattle Alaska run of Alaska Washington Airways, that they also be bicycle riders. After the pilot lands his plane at the dock at Alert Bay, Alaska, he is obliged to grab his trusty bicycle and make a three-mile jaunt over the rough country, find the customs officers, deliver his papers and then paddle back to his flying boat.

O. J. SAND has completed plans for the establishment at Spokane, Wash., of two branches of the chapter of the American Model Aircrafters and Glider Club.

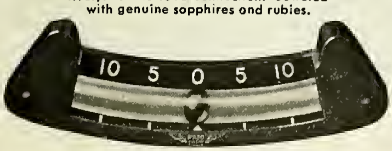
THE contract for improvements on the Dalles, Ore., airport calls for the moving of 7,000 cubic yards of material, smoothing and clearing the entire eighty-eight acre tract, and construction of 490 yards of fence.

A TRACT of land at Ft. Worden, Wash., has become a new Air Corps emergency landing field. It is equipped with a 3,000 foot runway. A hanger and quarters for Reserve officers will be built.

The Hans Mirow Flying Service and the Rassmussen Flying Service, Portland, Ore., will jointly operate a flying school. Students will receive dual instruction on the Waco biplanes of the Mirow service, and in the Aeronca of the Rassmussen service. Both services operate from the Swan Island airport.

A Triumvirate in the Cause of Good Flying

Altimeter, Type AA, 15,000 feet, $35
Borometric scole. Adjustment locks positively. Static tube connection. Jeweled with genuine sopphires ond rubies.



Ball Bank Indicator, Type A, $6.50
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Tachometer, Type TG, $45
Chronometric—positive indication, inherently ond permonently occurote. Connot be injured by ropid chonges of speed. Stondord equipment Air Corps.

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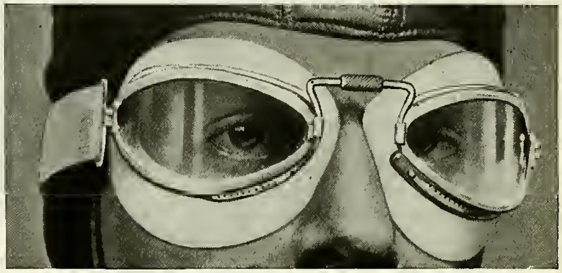
LUXOR GOGGLES



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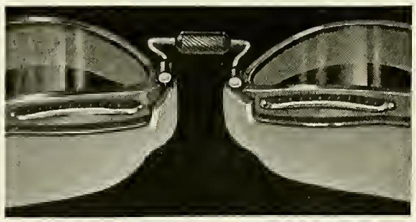

This detail photograph shows the special nose sections of the new tapered flaring sponge rubber cushions. Note in photo above, the amazing fit on both sides of the nose.

Besides curved, non-shatterable lenses, Luxor Goggles offer a combination of revolutionary features unobtainable in any other make. Among these are: Duraluminum Frames, for lightness and strength . . . Wide lateral vision . . . Micro-adjustable Bridge, for better fitting . . . Patented, non-fogging, balanced ventilation, to prevent sweating and fogging . . . Wide-flaring Feather Edge Cushioning, for comfort and to prevent wind-seepage.

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LUXOR No. 5 U. S. Air Service Model	$9.50	$19.20
REGULAR No. 6	$9.75	$26.00
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LUXOR No. 5	$7.50	$19.00
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General Instrument Equipment for Aircraft 1930

British Air Ministry Publication

A LOOSE-leaf booklet, describing the purpose, construction and proper installation of British aircraft instruments now in common use. Tachometer, air speed meter, turn indicator, pressure and fuel gauges, thermometers, altimeters and calibrating instruments are treated with the thoroughness customary in these publications.

The Airplane

By FREDERICK BEDELL

THIS book is much too sketchy and poorly balanced to serve as a text book and not sufficiently interesting to make popular reading.

On Secret Air Service

By LAWRENCE LA TOURETTE DRIGGS

THIS latest book of Colonel Driggs continues the adventures of Arnold Adair, the American ace of his creation. Although his new mission of espionage by air takes him from the active fighting front, Adair and his companion encounter a lot of action in addition to their mental gymnastics necessary to outwit the enemy.

Colonel Driggs' style for light reading is always engaging, and this effort is no exception, for there is not a dull passage in it.

Manual of Air Pilotage—Revised February 1930

British Air Ministry Publication

THIS manual is a veritable mine of instructive information, both theoretical and practical, with many reference tables in the appendix. It starts with definitions of terms used to indicate position, direction and distance, then moves logically through maps, charts and map reading. Compasses are treated in particular detail. Radio for direction finding and all other navigational instruments receive their full share of attention. Practical navigation, tactical problems in navigation and meteorology conclude the text.

The Sky's the Limit

By LIEUT. D. W. (TOMMY) TOMLINSON

IN a refreshingly frank and very readable manner, "Tommy" describes his uniquely broad experience in military and commercial aviation. As a young Naval Aviator removed from flight duty, "Tommy" buys a "Jenny" and become a "Gipsy Flier" to support it. The joys and tribulations of this bygone era are delightfully recounted. Restored to flight duty in the Navy, he participates in the development of combat tactics and formation flying from the new aircraft carriers. A tour of duty as test pilot on experimental designs concludes his military flying and he turns his energies into organizing a scheduled passenger service.

Although describing the problems of formation tactics and scheduled commercial operations in some detail, the book will easily hold the interest of a casual reader. It is also a good commentary on the continuous thought and effort necessary to perfect operations in both military and commercial aeronautics.

Aircraft Instruments

By C. J. STEWART

THIS book treats in detail the theory and mechanics of all types of aircraft instruments. Since the earth inductor compass is the only important instrument of American fabrication mentioned, the value of the volume is largely limited to technicians.

The Final Report of the Daniel Guggenheim Fund for the Promotion of Aeronautics 1929

THIS is not only a report of the Fund's activities during 1929, the last year of its life, but a brief recapitulation of its work in the preceding three years. A complete list of the Fund's publications is included.

AIR MAIL CROSSES THE DOLLAR LINE

(*Continued from page 55*)

course, the income from passengers and express is not included in the tables of mail income accompanying this article.

Mail and Passenger Routes Combined

All lines, domestic and foreign mail, non-mail and ferry, did a total mileage of 25,141,499, nearly two and a half times that of the year before. The passengers flown were 173,405, over three times those of 1928. It is interesting to make a comparison for all lines:

	1928	1929
Miles flown	10,673,450	25,141,499
Passengers flown	49,713	173,405
Express flown	1,848,156	1,866,879
Mail flown	4,063,173 lbs.	7,772,014
Mail income	$7,432,721	$17,042,521

During the first six months of 1930 twenty-nine airlines carried 133,005 passengers, nearly equal to the total for the entire year 1929.

It might be remarked, parenthetically and apologetically—for popular air express is remarkable for its modesty—that Henry Ford provided the bulk of the year's express, carrying his usual 1,600,000 pounds in his private airplanes between Detroit, Chicago and Buffalo.

"What we need," said Robert E. M. Cowie as president of the Railway Express Agency, "is planes in regular service with capacity to carry a payload of at least five tons." Then we would fill them.

Fifty various domestic airline services served the country during the year, covering roughly the field of passenger travel occupied by 160 railroads, and even this number is destined to be reduced—perhaps three great transcontinental systems, with as many feeders each as a thousand-legger, might be the ultimate."

However, all in all, progress is on the make. The pioneer railroad builders bridged the streams, fought the Indians, tunneled the mountains and then waited for crops to grow and peoples to increase. No delay like that stands in the way of the airplane.

THE entire line of "Gredag" Lubricants manufactured by the Acheson Graphite Corporation, a unit of the Union Carbide and Carbon Corporation, will be distributed and sold by the Carbon Sales Division of National Carbon Company, Inc., Cleveland, Ohio, beginning November 1.

FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ENGLAND

Order Construction of 40-Passenger Flying Boat

CONSTRUCTION of a monoplane flying boat which will be the largest heavier-than-air craft ever built in Great Britain has been ordered by the Air Ministry. The plane will weigh more than thirty-three tons fully loaded and will accommodate forty passengers.

The powerplant will consist of six Rolls-Royce "H" twelve-cylinder engines developing a total of 4,950 horsepower. The engines will be mounted in tandem in three pairs above the wing. High speed will be approximately 160 miles per hour and the cruising range, 1,000 miles. The Supermarine Works Vickers (Aviation) Ltd., will construct the flying boat.

LOWERING by more than five days the record for a flight between England and Australia, Wing Commander Charles Kingsford-Smith landed at Port Darwin, Australia, October 20. He completed a flight of 10,000 miles across planes, mountains, jungles and oceans from Heston Airdrome, England, in nine days and twenty-three hours. The previous record of fifteen days for this flight was established by Bert Hinkler in February, 1928. Wing Commander Kingsford-Smith used a 125-horsepower single engined ship on the record-breaking flight.

A SIKORSKY S-39 amphibion, made by the Sikorsky Aviation Corporation, Bridgeport, Conn., U. S. A., was recently purchased by D. S. Cottingham, director of the Cunard Lines and president of the Personal Flying Service, Ltd., of England. The plane, which was exported directly to Great Britain from the United States, was flown from the factory at Bridgeport, Conn., and landed in the Hudson River at the Cunard Line Dock where it was placed on board the *Mauretania* for shipment to England. The plane will be used for taxi and charter flying and will be operated from Croyden.

TWO Ford trimotor all-metal transport planes have been shipped from Detroit, Mich., U. S. A., to England for demonstration purposes in the British Isles and in many European countries. The demonstrations will be supervised by the Ford Motor Company, Limited, of England, and will be conducted in Rumania, Greece, Czechoslovakia and Egypt, as well as in England.

The planes which will be used for the demonstrations will be models 5-At-C and the 4 At.

THE Government of the United States of America has ordered three Rolls-Royce 825-horsepower "H" water-cooled engines. This is the engine from which was evolved the Rolls-Royce racing engine which powered the victorious seaplane in the last Schneider Trophy international contest and, in the same flying machine, holds three world's speed records. The United States Government contemplates using the engines for research and experimental purposes.

The racing engine evolved from the "H" motor develops more than 1,900 horsepower and has a weight of 1,570 pounds. The 825-horsepower "H" engine weighs 1,460 pounds.

THE first plane of the London, England, to Cape Town, South Africa, air service is scheduled to arrive at the latter city early in February, 1931. The route, according to present plans, will include Cairo, Khartoum, Lake Victoria, Broken Hill, Salisbury and Germistown. Intermediate landing fields where passengers and supplies will be picked up and repairs made will be established. All the airports of major importance along the route will be provided with complete facilities for repair. Equipment for night flying will be installed along the route. Planes accommodating fourteen passengers will be used. However, the transportation of mail will be given first consideration, the number of passengers carried being reduced in favor of the mail if necessary.

GERMANY

THE Junkers-G 31 was constructed especially for the transportation of freight and extraordinarily heavy and bulky pieces for Guinea Airways, Ltd.

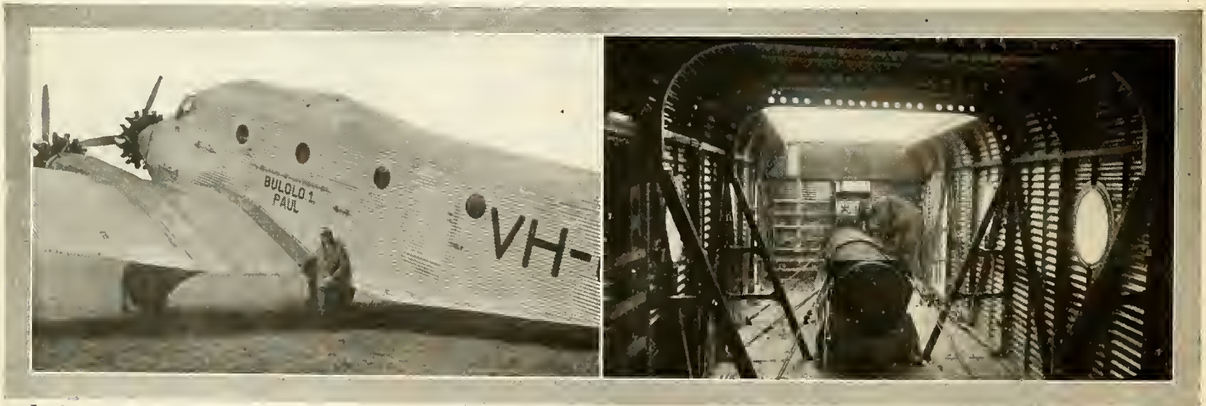
On the goldfields of the interior of New Guinea, sixty companies have been established. From Salamoa to Wau, where only footpaths cross the Urwald (forest) and the mountains are 16,000 feet high, the Guinea Airways, Ltd., has operated an express line for some time and carried all the merchandise used there. Tractors and trucks have been carried in the five Junkers-34's, which the Guinea Airways uses. Two tons of mail monthly are carried.

One of the largest of the sixty companies in the region, the Bulolo-Gold-Dredging Company, plans an extensive development of its goldfields. They need two barges, a water-turbine-generator-attachment and other machinery, altogether 3,000 tons, which can be carried there only by air.

The difficulty in carrying out this plan, however, lies in the fact that the smallest piece of the equipment weighs 7,056 pounds. The Bulolo Gold Dredging Company and the Guinea Airways Ltd. were obliged to find a plane that could accommodate this equipment and that was strong enough in its construction to carry the weight. The company adopted the Junkers-G 31 after demonstrations were made. Three of these ships were to be completed by November 1.

[E. P. A. HEINZE]

A VERY interesting competition was held recently at the Central Airport, Berlin, sponsored by the German Aviation Union. The competition, held to promote interest in aviation, was termed "German Air Games 1930" and constituted complete departure from the old method of attract-



Junkers G-31 built for Guinea Airways to carry heavy mining equipment over mountainous route to New Guinea gold fields

ing the general public principally by providing stunt flying.

Instead of aerial acrobatics, races and a kind of aerial gymkhana were resorted to. In some events the competitors were rated individually, in others they were divided into opposing teams. In the latter case, each competitor on the winning team was awarded one point so that at the end of the competition each competing plane had a number of points to its credit, the one having the highest total being proclaimed victor of the meeting.

One of the individual events consisted of a landing test over an obstacle onto a marked spot. Light planes were eligible, only the pilot occupying the plane during the contest. The competitors had to glide down over a rope stretched over two masts twenty-six feet high and 130 feet apart and land, without using the throttle, inside a marked circle 800 feet distant. The competitor who stopped nearest the mark was declared the winner.

An air photo competition was held. Each competing machine carried a pilot and an observer to manipulate the camera. Before starting each crew received a map on which was marked a point where a balloon was anchored to the ground. The object was to reach this spot as fast as possible, snap three photos, return and develop and copy them, and submit the best one to the judges. A handicap system was adopted by which the slower and less powerful machines were given a head start.

THE Junkers Aircraft Company of Desseau, Germany, has announced its annual report, which shows the company has developed favorably. It has a share capital of 10,500,000 marks ($2,500,000) and not only made good its loss of 455,545 marks ($108,500) suffered in the previous business but has, after the deduction of this loss, made a profit of 1,863,358 marks ($443,000). The total turn-over amounted to approximately $2,500,000 and has remained practically the same as in the previous year. The foreign business has been double the amount of the domestic business.

THE Argus Motor Company, whose four-cylinder inverted engines were such a success in this year's International Light Plane Contest, has completed a new engine with eight cylinders. This engine has two banks of four cylinders each inverted and set at an angle to one another. The motor is expected to have an output of 170-200 horsepower and is now undergoing tests.

FOLLOWING holmolgation of the instruments used by Alfred Grundke in a Junkers J 50 W, powered with an eighty-five-horsepower Armstrong-Siddeley Genet engine, on a flight June 13, 1930, the German Air Board has announced that the following new German records have been confirmed as international records by the FAI: Distance over a closed circuit, 1,305.2 miles; speed over 100 kilometers (62.14 miles) 102.8 miles per hour; and duration, 16 hours and 29 minutes.

FRANCE

INAUGURATED without government subsidy, the Rapid Air Transport Company is providing passenger, mail and express air transport service on four lines as follows: Paris-Deauville-Cherbourg; Paris-Le Touquet; Paris-Lympne and Paris-Geneva. It is reported that French areonautical interests are following this development closely.

ENCOURAGED by the subsidy of about $200,000 and the 1930 appropriations of the government, the number of tourist planes purchased by individuals since April 24, 1930, has reached sixty-eight. Flying clubs have purchased thirty-two of these planes.

THROUGH a close coöperation recently effected between the air lines operated by Compagnie Generale Aeropostale, air mail from Europe to South America reaches Chile in eight and one-half days, and Bolivia in eleven days. The time now required for air mail to reach South America from Europe via planes of the Aeropostale company is approximately eighteen days less than by other means of transportation.

FINLAND

NIGHT air mail service in Finland between Helsingfors, Stockholm and Copenhagen will be operated for three months in the summer of 1931 and by 1935, according to present plans, this service will be maintained throughout the year. Night air mail service on this route was operated on trial for one month in the summer of 1929 and for two months during the summer of 1930. The Finnish Air Transportation Company plans to purchase improved equipment for the night service before 1936.

DENMARK

SUCCESSFUL completion of an aerial tour around Denmark in a ten-passenger Fokker F-7 has been announced by officials of the Danish Goodrich Tire and Rubber Company, sponsors of the cruise. The aerial journey was made for the purpose of visiting Goodrich dealers and to publicize Goodrich products in Denmark.

Landings and take-offs were made in eight of the largest towns, although no regular airports were established. In all the towns at which the plane landed or flew over, dealers made special Goodrich exhibitions.

The tour required five days to complete and a distance of 1,200 miles was covered in a total flying time of eleven hours and fifty minutes, at an altitude between 700 feet and 5,000 feet. Favorable weather was encountered throughout the flight. The plane used on the tour is regularly operated on the Copenhagen-Hamburg route.

A survey of Danish aviation announced by the Goodrich company disclosed that the Danish Aviation Company has, from its inauguration in 1920 up to 1930, flown 2.6 million passenger kilometers without a fatality. Completion of scheduled flights has never been under 82 per cent; in 1928 it was 96-97 per cent and in 1929, 100 per cent.

The Kastrup Air Harbor in Denmark is 150 acres in extent and, according to present plans, will be extended to 600 acres.

THE NETHERLANDS

EXPORTS of aircraft from the Netherlands are greatly in excess of the imports of these products. On the other hand, the exports of aircraft engines are exceeded considerably by the imports of aircraft power plants.

There were 61 airplanes exported in 1928, 54 in 1929 and 42 in the first half of 1930. The greatest number of aircraft exported went to the Netherland East Indies where 21 of the 1929 shipments were consigned, as were 22 of the shipments for the first half of this year. The remainder of these shipments went to France, Sweden, Switzerland, Hungary, Italy, Great Britain, Belgium, Rumania, Spain and Japan.

France, Great Britain and the United States respectively, lead among the countries from which aircraft engines were imported into the Netherlands in 1928, 1929 and the first half of 1930. There were 206 engines imported in 1928, 158 in 1929, and 101 in the first six months of this year. The 1929 importations were: France 81; Great Britain, 50; and the United States, 12. The 1930 importations were: France, 48; Great Britain, 30; United States, 16.

ITALY

A SURVEY of airports in Italy prepared by the Aeronautics Trade division of the U. S. Department of Commerce, indicates that rapid progress in the development of commercial aviation is being made in Italy. In the period from 1926 to 1929, the mileage of Italian airlines increased from 3,000 miles to more than 8,000 miles; the number of miles flown, from 325,000 miles to 1,900,000 miles, and the number of passengers carried increased from 4,000 to more than 25,000.

Extensive taxi and air sightseeing services are operated at various Italian bases. During 1929, 7,900 unscheduled flights were made by fifteen operating companies, in which 9,300 passengers were carried a total of 165,000 miles.

Italy is not readily adaptable to the establishment of airports for large landplanes, according to the results of the survey. The difficulty of converting mountainous or marshy lands into suitable landing fields has been a contributing cause to the more rapid development of seaplane bases for commercial services. For this reason, therefore seaplanes are employed on most of the Italian airlines.

Italy's airports are divided into military, civil and emergency fields. The civil airports are owned by the provincial and municipal governments, flying clubs, or private companies. All important landing fields are designated as customs airports. There are now over a hundred emergency fields and many others are being prepared.

CANADA

A PARACHUTE, designed to open automatically when a parachute jump is made, has been developed in Canada. The parachute weighs one and one-quarter pounds.

TWO hangars will be constructed at the municipal airport, Vancouver, at a cost of $35,851. Contract for the construction of these hangars was made to the lowest of ten bidders although the cost submitted is in excess of the $30,000 originally allotted for this purpose. Construction of an ornamental gate and entrance, stucco exterior and concrete aprons was dropped when no bids covering these items were sufficiently low.

THE Department of National Defense has issued a report on civil aviation and civil government air operations for the year 1929. The report is contained in a volume of 100 pages of text, illustrations and tables. The book is intended as a complete resume of the conditions and development of civil aviation in Canada in 1929.

[J. MONTAGNES]

WITH the object of fostering the organization of an airway service between Canada and the West Indies, Colonel T. R. St. Johnston, governor and commander-in-chief of the Leeward Islands, recently paid a visit to Ottawa where he conferred with government officials.

TO PLACE a couple of trappers along the Arctic shore of Canada's mainland, W. Sherlock of Commercial Airways, Edmonton, made a 6,000-mile flight during the freeze-up period along the Arctic shore, traveling over little used airways of the North. He used a Bellanca.

CANADIAN mails bound for England and European points, formerly flown from Toronto and Montreal to Rimouski on the St. Lawrence River to catch outgoing steamers, will in the future be flown one-third of their trip to England. A recent test showed the advisability of flying the mail to Forteau Bay in the Straits of Belle Isle. In this way the mail travels 900 miles of its 2,100-mile journey from Montreal to England, and saves another day in the delivery of mail at the destination, making a saving of two days in all. The new service is operated by Canadian Airways of Montreal.

PILOTS of the Ontario Provincial Air Service in Northern Ontario report that caches of gasoline for use of its planes on forest patrol duty have been found rifled of all gasoline. The pilots are making up solutions of gasoline, sawdust and molasses to be placed with the regular gas cans, and hope that the thieves will take the wrong containers.

MEXICO

A MASTER pilot's scholarship in aviation to be awarded annually to a Mexican youth selected by competitive examination, has been announced by Theodore T. Hull, President of C. A. T. Air Lines.

The Hull scholarship will consist of an eighteen months' master pilot's transport course with primary training at a recognized aviation school in the United States and advanced training at the C. A. T. division point in Torreon, Coahuila.

[M. HURSJ]

THE Secretariat of Communications has announced that all airports in Mexico are under Federal regulations.

INCORPORATION of the Cia. de Transportes Aereos Mexico-Cuba S. A., has been effected for the purpose of transporting mail and passengers by airplane from Mexico to Cuba. A terminal will be established in Veracruz and another at Havana, Cuba. Stops will be made at Progreso, Yucatan. It is planned to establish intermediate stations at Puerto Mexico, Frontera, Laguna del Carmen and Campeche.

A REGULATION requiring all airplane pilots to have license cards has been made by the aeronautical section of the Department of Communications in order to protect the public against traveling in planes that have not complied with the flying regulations. These cards must be placed conspicuously in the interior of the cabins to show the passengers that they are traveling in an airplane that has been fully inspected and authorized to carry passengers.

PERU

[H. GOMEZ-CORNEJO]

AS THE result of the revolution in Peru, the Inspección General de Aeronautica has been abolished under the presidency of Luis M. Sanches Cerro and three new departments of Peruvian aviation have been created under the Ministry of Marine and Aviation as follows: Administration of Military and Naval Aviation; Administration of Civil Commercial Aviation; and Administration General of Aviation. Commander Rotalde of the Army has been appointed head of the Ministry of Marine and Aviation and Capt. Edilberto Peralesn is director general of Naval aviation and administration. Commander Juan O'Connor has succeeded Commander Harold B. Crow as Inspector General for Peruvian Aviation. Commander O'Connor, formerly director of the Military Air Service at Las Palmas, was recalled from Europe where he has been for the past two and one-half years.

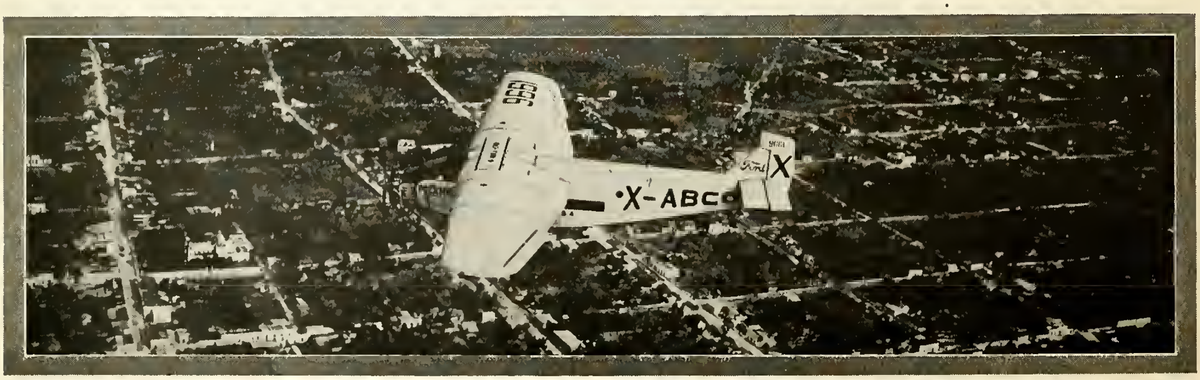
In addition to that of Commander Crow, the contracts of the following have been cancelled: Commander Ben H. Wyatt, as director of the Naval Air Base and School at Ancon; Capt. Charles Whitehead, assistant to Commander Crow as aeronautical engineer and ground organizer of all Peruvian air bases; and Commander C. G. Davy, U. S. N. retired, director of the Peruvian naval school at La Punta.

VENEZUELA

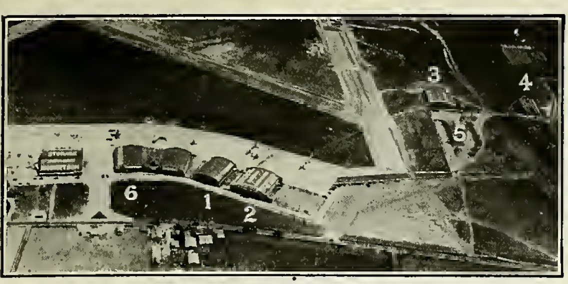
A MODERN system for fueling aircraft has been installed at the Grano de Cro airport northwest of Maracaibo. The apparatus is an American unit designed to pump, measure and deliver eighteen gallons per minute. The station serves aircraft within a distance of fifty feet.

BRAZIL

CONSTRUCTION of a large airport is planned at Rio de Janeiro. The field will be developed on the reclaimed land in the harbor which the Municipal Council of Rio de Janeiro has been requested to cede to the National Ministry of Transportation and Communication. Several hangars and other buildings will be erected, according to present plans.



Ford trimotor transport operated by the Mexican division of Pan American Airways between Brownsville, Texas, and Mexico City



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THE "DRAGON FLY" MODEL

A TANDEM MONOPLANE OF RACIAL DESIGN

By

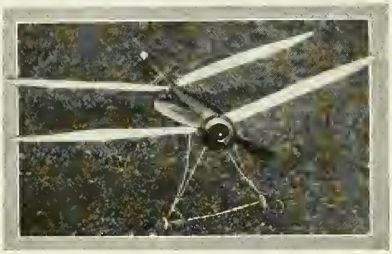
R. E. DOWD

AN extremely interesting variation of model airplane work is afforded by the study of one of Nature's fliers, as well as by the attempt to reproduce it mechanically. The task is not an easy one, although it is well within the range of possibility for almost any of our natural fliers. The fascination of seeing your mechanical bird, insect or other flying creature composed of sticks, paper and rubber, fly off majestically, displaying perhaps some flight characteristics of its natural self, is well worth the time and patience required for its construction. Anticipating the spectacular value of a "mechanical dragon fly," I set about to design and construct such a model for an indoor meet of the Aero Club of Ithaca. It proved a splendid flier, but it was not until it had drawn forth a storm of applause by sensationally buzzing over the heads of the astonished spectators who were seated in the balcony that I really appreciated how great can be the public success of such mechanical reproductions of natural fliers.

For those who study aviation seriously there is another reason why this model should command interest. It is because it is a representative of the rather rare tandem monoplane, a type that still has a few clinging advocates. Perhaps the best known tandem type flying machine in history is the Langley Aerodrome. This design flew successfully as a model propelled by either steam or gasoline engines, but when built on a full-size scale met with difficulty. Some years later the famous Montgomery tandem monoplane glider achieved fame by being dropped from balloons at altitudes as great as 4,000 feet. More recently the Peyret tandem monoplane glider, flown at Itford, England, by pilot Maneyrol sprang into prominence by defeating all competitors in the 1922 meet.

The great Italian Caproni triple tandem triplane is perhaps the most ambitious attempt in this class of machine. This greater monster of the air came to grief in experimental flights from the water. Torsional strength in the fuselages of such craft seems to be the major problem.

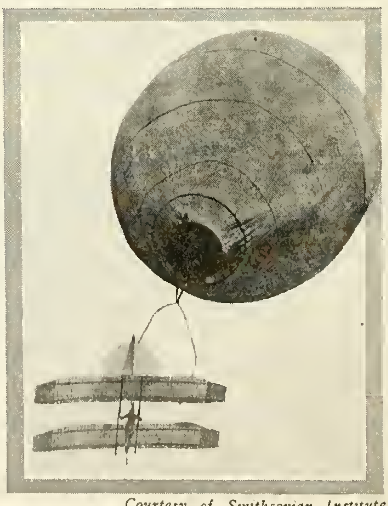
At first the tandem arrangement of surfaces is confusing from the standpoint of stability, but if we consider it a canard (see Watkins' Canard, July AERO DIGEST) and picture the forward plane as an oversize stabilizer we can grasp the idea. In every case it is necessary to have a greater angle



The Tandem "Dragon Fly"

of incidence on the forward surface relative to the airflow or use a negative stabilizer at the extreme rear as in a conventional type airplane. Note we say "relative to the airflow" because naturally there is a down wash from the forward plane.

In our Dragon Fly we have no stabilizer. There are just two similar planes set at different angles and the stability is perfect. The model is not difficult to build and will prove such a popular flier at any meet that it is worth the time required to make it.



Courtesy of Smithsonian Institute

The Montgomery glider of 1905

A dragon fly carries its front wings with a forward sweep, or as we might call it, a reverse sweep back. Such an arrangement seems to cause great instability and was therefore abandoned in favor of the straight wing. Apart from this, the resemblance is rather striking, and since the propeller becomes invisible when in flight, the insect idea is carried out without too apparent deviations.

Fuselage

The fuselage is made of 1/32 inch thick spirally wrapped bass wood, with the usual end reinforcement, propeller bearing and anchor plugs. A body is added to carry out the appearance of the insect, and the head is developed into a spinner for the propeller. As mentioned above, the fuselage is of bass wood wrapped around a ¾ inch diameter dowel. The seam is made spiral so that the warping tendency is obviated. It is lined and wrapped with doped Japanese rice paper. The lining is, of course, applied before the stick is wrapped. Both the front and the rear ends of the stick are reinforced by a white pine liner ¾ inch in diameter and ¼ inch deep. A 7/16 inch square hole in the center is provided to receive the propeller bearing plug in front and the tail plug in the rear. The tail plug is made of white pine. A 7/16 by ¼ inch square shank is provided on it to take the tension of the rubber. A 1/16 inch diameter steel wire anchor hook passes through the block and is formed into an eye and drawn back into the block for the attachment of the winder hook. The nose plug is of exactly the same proportions except that it is squared off on its outer end instead of being rounded. Outside reinforcements for the tube are provided on both ends. They fit snugly on to the tube and are cemented in place. The body is made of balsa wood. It is applied to the tube in an upper and lower piece, both of which are grooved to receive the tube. The shaping is done, of course, after both halves are cemented on.

Planes

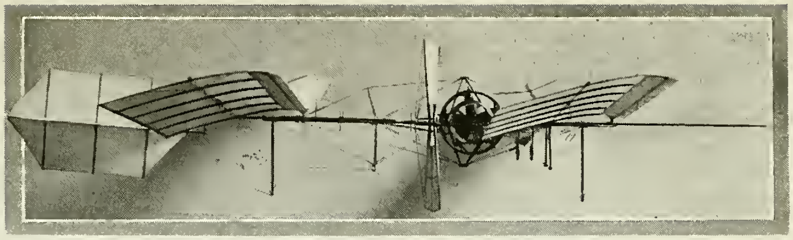
The front and rear wings are identical except for their dihedral angles which differ as indicated on the drawing. This difference was used to minimize the down wash and is to be found in the actual insect. As far as the construction work of the wings is concerned, they are identical, since they are built

up as individual units and united afterwards.

The ribs are all of 1/32 inch bass wood and are cut approximately to USA-5 section. (See Bantam wing section—May AERO DIGEST.) They are notched on their top and bottom edges ⅛ inch wide by 1/32 inch deep to receive the bass wood spar strips, which are of these dimensions in cross section. The outline is entirely of bamboo, cut and planed so that the glazed or hard surface is on the outside of the bends. The section of this outline is approximately 1/32 by 3/64 inch. When the right and left wing frames of each unit are complete, they are united by inserting a piece of bamboo ⅛ inch wide—the depth between the spar strips. This piece is bent to the required dihedral before being used so that it is merely necessary to cut it to fit snugly between the inner ribs and to lash and cement it in place. It will be found that this method of splicing is both reliable and simple. The stud part of four small-size dress snaps is sewed on to the top surface of each plane at the point where the inner ribs and the spars intersect.

The front plane is mounted on a plane hanger composed of two (20 ga.) steel wires which are securely attached to the body by being drawn into place in specially cut grooves across the balsa wood body and then stapled in position by light wire staples on either side. The lower ends of the wires are bent so as to encircle the other part of the dress snap and the whole mounting is adjusted to hold the plane at seven degree incidence. The slots mentioned are filled up and a strip of fabric applied to smooth up the job.

The rear hanger is constructed on the same plan but in this case the wires are soldered to a tin plate one inch square which is formed to fit the tube. It is held in place by wrapping with rubber strands which allow longitudinal shifting for adjustments. The incidence of the rear plane is 2½ degrees.



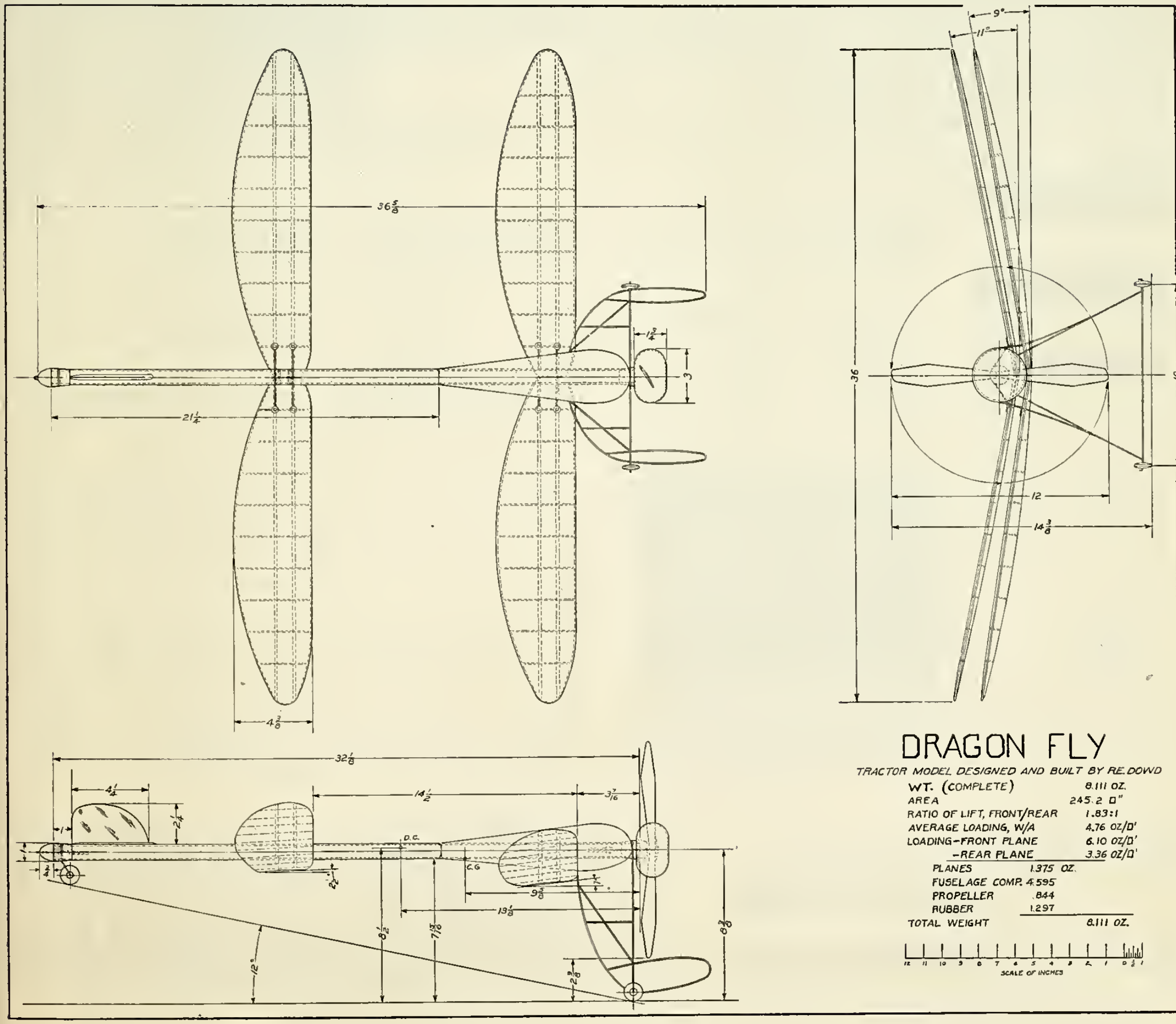
Courtesy of Smithsonian Institution

Langley's gasoline engine model tandem monoplane

Fin

Attempts to fly this model without a fin were not successful. The size worked out by trial brings our directional center (D. C.) .048 times the sum of span plus length. The transparent celluloid fin is mounted in a slotted base strip as shown on the drawing.

(Continued on following page)



(*Continued from preceding page*)

Transparency of this member is resorted to in order to preserve the general lines of the model, which would be lost otherwise. It is quite possible that this fin might be dispensed with entirely if the dihedral angle of the rear plane were steepened. However, the present angle of 11 degrees is about all that a plane will stand without being too sensitive to lateral gusts. The thickness of the celluloid is about 1/32 inch.

Undercarriage

In the design of the undercarriage an attempt was made to represent the dragon fly's legs as well as to provide ample propeller protection. Which one of these features was better accomplished is a matter of opinion. I venture to say that the propeller requirements have been favored. Steel wire of 1/32 inch diameter is used throughout and all intersections are wire wrapped and soldered. Two one-inch diameter celluloid wheels are used, mounted on a through axle. The details of construction are quite clear from the drawing so that further description seems unnecessary. The rear wheel, which is of the same size and construction as those forward, is mounted on a simple wire V-shaped member which is securely lashed to the fuselage.

Propeller

The propeller used on this model is identical to that used on "Pegasus—The Flying Horse" (November, 1929, AERO DIGEST). In plan or outline it is similar to the familiar Lang type. Probably the most interesting thing about the propeller is the head which is developed to spin with it. This head is turned from a piece of balsa wood to the dimensions given. It is then cut in halves on its lateral center line and lightened out leaving a wall thickness of about 3/32 inch to ⅛ inch. At this stage the cup shaped halves are assembled around the propeller. Suitable openings are cut to accommodate the propeller blades. The head and protruding propeller blades are covered with doped Japanese rice paper. The propeller is provided with a swivel. Two one-inch diameter holes are provided in the head, one for inspection of the swivel and the other for running clearance with the forward end of the fuselage. The inspection hole may be covered with a piece of doped paper to improve the appearance of the model. This arrangement allows easy emergency inspection by cutting away the paper. The propeller shaft is 1/16 inch steel wire, and the bearing is brass tubing ⅛ inch outside diameter and 1/16 inch inside diameter.

Powerplant

The power used to drive this model is furnished by a skein of 20 strands of ⅛ inch flat rubber. It is lubricated with glycerine.

Performance

In spite of its being somewhat of a freak, Dragon Fly has displayed rather remarkable power of flight. After a run of six or eight feet the tail rises and the fuselage levels out. At about 15 feet it takes off and flies buoyantly, rising to an average altitude of about 50 to 75 feet. Indoor flights of several hundred feet distance are not uncommon for this model. Although this model has been flown to some extent outdoors, the best results have been obtained indoors. The pronounced dihedral angles of both sets of wings without question make the lateral stability more or less susceptible to gusty weather.

Once in the air it looks like a gigantic dragon fly buzzing on its way. Being finished black, the propeller is scarcely discernible, and as the model darts here and there it looks every bit like a magnified insect. It would be a bit disconcerting to encounter such a creation without knowing of its existence beforehand. It looks as though we have introduced a new problem for the professional insect exterminators.

Things to Remember

Here are your points to remember:

Can you name three historical tandem type airplanes?

Can you explain how they can be made stable?

What is down wash?

Why do we need a fin?

What does excessive dihedral cause in gusty winds?

COMBINING TRAINING GLIDERS

(*Continued from page* 51)

result of crossing some of the multiplicity of cables on Zoeglings in assembling them.

When on the ground the Franklin glider rests on an Airwheel, which absorbs the shocks of hard landings and uneven ground.

In training students at our school, we attempt to teach them the use of the controls by towing them on the ground behind an automobile.

Approximately 200 feet of quarter-inch Manila rope is fastened to a hook in the nose of the glider and the other end to an automobile. The beginner is seated in a comfortable deck chair type seat in a cockpit, which gives him a feeling of security and intimacy with the ship. Perching the student out in the open, as is the practice in European type training ships, creates a tendency to maintain level flight by shifting the body and prevents bodily relaxation and mental concentration. Yet one of the first rules of flying is *relax*.

The instructor, who drives the car, slowly tows the ship across the field at a speed of from twelve to fifteen miles per hour (air speed), constantly watching the novice for mistakes. Since the ship is supported on the ground by a central pivotal point, the wheel, it can lean in all directions, and the student learns from the first the use of the ailerons, elevator and rudder, and how to coördinate them. The inevitable mistakes of the novice handling a strange machine are easily corrected because of the constant speed and the resulting constant air flow on the control surfaces. Even in such a trip across a small pasture he has time to react to the new condition and profit by his harmless mistakes. Neither he nor the ship is at all likely to be hurt at such slow speed, and he does not leave the ground. After a half-dozen such trips, which are made in rapid succession, he has thoroughly familiarized himself with the controls. He has learned to fly the ship in straight level flight *on the ground. He has demonstrated this,* and the element of guesswork has been eliminated.

The student is next told to nose the ship up a little; the speed of the car is increased slightly; and the glider ascends to an altitude of three or four feet. At this height it is towed across the field. The student is up in the air and flying but at a perfectly safe altitude and speed, free to cut loose from the rope with his safety release whenever he wishes.

As the student's skill increases trips are made across the field with slowly increased altitude. When he has attained thirty or forty feet, he is ready to make simple turns. Each step leads to the next, and by the time a few short weeks have elapsed he is putting the ship through all its paces. He does this with a confidence he could not have were he flying a Zoegling, for he instinctively senses his ship's balance and advanced engineering. The same ship which he found so easy to learn on he now finds is a wonderful performer for advanced flying.

As a result of advanced American engineering and typically American production methods of teaching, our student is an advanced glider pilot while another, who has used imported methods unsuited to conditions here, is still in the beginner stage.

My associates and I believe that, in addition to the Zoegling's other shortcomings, it is poor economy for a glider club or school to purchase a ship which can take the student only through the A B C's of gliding. The Utility (American) type not only speeds up the process of learning the principles of flight, with the gruelling work and frequent repairs, eliminated, but carries its owners through the list of glider maneuvers and on into soaring flight. American glider clubs, which are organized in small independent units, cannot afford to buy two or three types of gliders.

AIR OPPORTUNITIES

(*Continued from page* 38)

profoundly certain that it wants it. But there was hardly ever an industry that went so far and so fast on an assumption as this one. Get to the bottom of aviation's hopes, intentions and ambitions and you discover that they are all based on the assumption that the busy American wants to get where he is going as quickly as possible. It sounds reasonable, and we suppose it's true. But it is an assumption, and we sink or swim according to its soundness or otherwise.

On such assumptions big business goes ahead, even in the face of doubts and discouragements. On a similar assumption an ocean flier sets out for London or Paris or other attractive cities—on the assumption that his motor can and will keep running. If he assumed anything else, he wouldn't start. On the same sort of assumptions a man gets married, or buys a dog, or opens a store, or makes a date with his best girl. He doesn't know what will come of it, but he hopes for the best and expects it. And without at least a minimum of desperate and optimistic courage, we might all as well lie down at once and fold our fingers around a lily.

On the assumption that speed is important to the modern world, aviation has gone a long way. It must go a little farther by risking its last shirt on providing air opportunities for its prospective customers. Naming no names, I know of one bold business man in the industry who has done so, and there are others. Having spent his substance freely for a year or two on developmental work of one sort and another, he shot the works on an ambitious airline. If it makes good, his chickens will all come home to roost and the bread thrown on the waters will be back with interest. If it fails, he is very likely to decide that there's nothing in aviation that is worth the trouble and anxiety it has cost him, not to mention the money. And there will be plenty of pessimists to say "I told you so."

Surveying the past season and the one to come, we see plenty of evidence that "air opportunities" is become the slogan of the industry. Even as I write, it is reported that four planes are on their way from Atlanta to Los Angeles to inaugurate a Southern transcontinental air mail and passenger service, the first direct service from the Southern airport to the far coast. On the same date the Hon. William G. McAdoo came into Washington from Los Angeles in a Lockheed, having made the trip to discover "what a fast airplane would do on normal passenger run

(*Continued on following page*)

(*Continued from preceding page*)

without special equipment." It would be more to the point to say that he was demonstrating the feasibility of a coast-to-coast flight between dawn of one day and dusk of the next, a suggestion for an "air oppotrunity" for America in a hurry. Incidentally, it might be said that Mr. McAdoo makes his own air opportunities. I wish I'd thought of it first, and if somebody will supply the plane and pilot, I'll be glad to offer my services as passenger for a very low figure in any similar demonstrations, particularly to Miami, Havana or other points south of the freezing point and the furnace belt.

Whatever happens tomorrow and the day after, history will have to allow this generation of American aviation due credit for banking boldly on the future. With the stock market still submerged and prosperity still apologizing for the patches on its pants, the new ventures in air transportation are obviously not for the purpose of promoting a stock issue or wangling another merger at somebody else's expense. They represent a determined policy of providing air opportunities for the public to take 'em or leave 'em. There was no known way, for instance, of discovering if the public would patronize transcontinental train-and-plane service until such a service was provided, perfected and proved in operation. The same goes for nearly every new line that publishes routes, rates and schedules, opens ticket offices and waiting rooms and starts a regular sky service from here to there. And since it's not considered quite ethical to shanghai passengers or to get them into the planes by bribery and corruption and other methods of enforcement, it sometimes needs a tough patience and pocket book to wait for the public's verdict.

That verdict will probably be given conclusively within a year or two, as air opportunities are increased. There is every reason to be confident of the outcome. Nothing has disproved the assumption that speed is a major need of modern civilization; many things confirm it. The triumphs of aviation in the past have nearly all foretold an essential public service of the future. The public waits now on air opportunities.

There's a cheerful sideline to this prospect for the student fliers, the model makers and the host of youngsters who look skyward for the future. There was a space and spell when a flying school could and would promise the student nearly everything except a job. Some of them promised the job, too, but didn't intend to be taken too seriously. But the lack of air opportunities was discouraging to many would-be fliers, who dared not risk the investment of time and money which it takes to make a pilot so long as the public was just flirting with aerial transportation. Together with the manufacturers, the operators and the investors in aviation securities, these lads are very much concerned with this problem of providing "air opportunities" for the traveling public of America. When the traveling salesmen everywhere are padding their expense accounts with plane fares, when a busy man can take a plane from any city to any other city and arrive on schedule, when tickets and time-tables can be trusted and airports are run like railroad terminals, when the commuter complains if his plane from seashore or country home is five minutes late, when the American people have adequate air opportunities and make full use of them—then the bright boys who know how to fly will have the world by the tail.

Let us listen once more to Commander Hedtler, who knows what he is talking about. "The period of public education in air-mindedness is past. It's time to provide air opportunities for a public that is ready to fly."

WHAT ABOUT THAT 55 PER CENT?

(*Continued from page 58*)

from their bases. Radio has been developed to enable commanders to direct the maneuvers of these planes from other aircraft or distant bases. However, radio is not infallible and in time of war may not even be used. It therefore cannot be depended upon—which circumstance requires the use of what is termed indoctrination. Squadron commanders and pilots must study, discuss and be taught the methods to adopt in all possible occasions that may arise. This indoctrination of military pilots may require weeks, sometimes months, but in the end those responsible for service flying know that appropriate action will be taken in any emergency.

Isn't it valuable to know that a landplane can usually be put down in the water with a strong chance of causing little damage? Could not the policy of indoctrination be borrowed from the military services and used to advantage by large operators? Shouldn't knowledge of this kind be broadcast to every licensed pilot in the country?

It is obviously impossible for all pilots to exchange experiences with all other pilots. The fact that a certain crash resulted from an error of the pilot is interesting; moreover, it is valuable in the compiling of statistics. But why stop with statistics? Let us assume that in the past year there were 100 crashes resulting from errors of pilots in attempting to "stretch the glide." If instead of merely learning from the daily newspaper that a crash occurred, pilots could learn from some authoritative source the real cause and if they read that fact 100 times a year, they certainly would retain in their subconscious minds that it is dangerous to "stretch the glide."

The question of publicity in airplane crashes is a much argued topic. There are perhaps many valid arguments for and against such publicity. But it appears reasonable that some information on crashes should be made available to the pilot—especially inasmuch as he is charged with being directly responsible for more than half of them. At present, the Department of Commerce inspectors ought to be the best pilots in the country, because they have first-hand knowledge from their investigations. But this valuable information, together with the lessons deriving from it, apparently is stowed away in confidential archives to be released only in the form of statistics.

It is impossible to give the flying student all this knowledge in ground school. He must also learn by experience of others. It seems logical, therefore, that there should be some agency that would take the necessary interest in the continued education of pilots. This agency, which might be the National Air Pilots' Association or some similar body, could broadcast essential information to all pilots. If not the pilots' association, perhaps some foundation supported by manufacturers and operators could carry on this work. Personally, I should suggest an additional monthly publication from the Department of Commerce, edited to be of human interest. It would include the personal experiences of individuals and organizations, up-to-date methods in use in the art of flying throughout the world and, most essential, a statement in regard to every crash with a description of what was done and what the pilot might have done to avoid the accident.

This may not be the only way to cut down that "fifty-five per cent," but a broadcast of intelligent, useful information on the mistakes of others would certainly be a big factor in reducing it.

COLLEGE FLYING

(*Continued from page* 59)

a great deal more service to any given assignment than the chairman alone possibly could. A number of minds would be working on a project rather than one, and instead of furnishing money, each member would be giving but a portion of his available time. The chairman could then devote his time to governing and supervising operations rather than to actually carrying them out unassisted. That is the appropriate function of every executive. It must be realized that the chairman, like all the others, is primarily a college man who must attend to his studies before anything else, and he cannot do justice to both studies and flying work if he is overburdened with the latter.

As it is now, each member club complacently sits back and awaits the fruits of the chairman's efforts. Hence, when he cannot show results, they immediately lose interest. If, however, they themselves had a part in the work, they would be in a position to judge the difficulty of agitation and negotiation, and would be less harsh in their criticism of the chairman.

A national association like the I. A. A. is probably the only hope of the college clubs, and the sooner they grasp that fact the sooner they will attain success. The individual groups must come to regard the national body as something of which they are a part, something which can return great dividends for the time and thought they devote to it. A bit of reflection shows that a united group can accomplish a hundred-fold more than all the single units together.

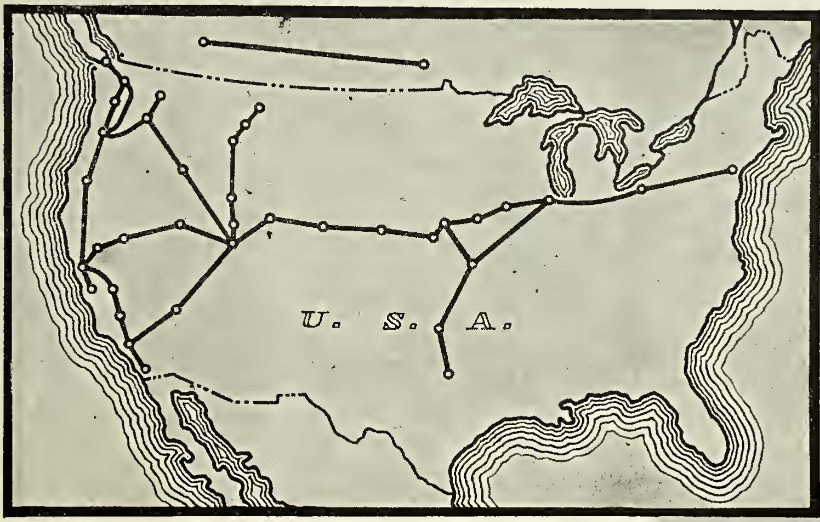
Although an efficient national organization is not the only essential for success—for individual coöperation and club organization are also important—it does have the greatest bearing upon collegiate flying activities. Except for financial difficulties, there is little to retard college flying. To my knowledge, there is little faculty opposition. The only college that has faculty opposition is Yale where one of the oldest and most successful flying clubs is operating. There seems to be little or no parental opposition. At New York University every member under twenty-one years who passed the physical examination brought his parents' consent in writing, without exception. College football a generation ago could not furnish a similar record.

Even though operating as a one-man organization, the I. A. A. has already procured reduced rates from several flying schools, as well as from manufacturers of planes and accessories.

At the next conference of the I. A. A. this fall, I hope to see considerable reorganizing done. It will be conducive to progress if all delegates are previously informed of all issues to be introduced so that they may vote more intelligently than in the past.

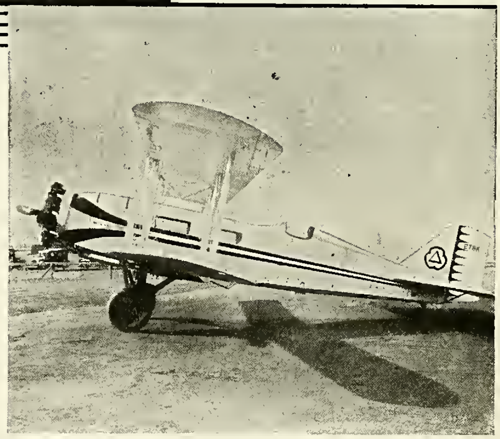
Collegiate flying has made a very admirable start; it certainly ought not to falter now. It is exceedingly important that all college men who wish to enter the industry after graduation get practical experience previously; for there are many employers who prefer the practical knowledge of the worker to the theoretical training of the collegian.

EVERY DAY ADDS 25,000 MILES to the Boeing mail-plane record!



Left—Eight American and one Canadian mail-passenger lines flying on routes shown at left use Boeing equipment.

Below—Hornet-powered Boeing "40" of Empire Oil Co.—one of a number of corporations which have purchased these dependable, economical planes.



NO PLANE ever built has outlived the famous Boeing "40" in continuous service. Already several "40s" have flown 3,000 hours on the transcontinental route and are still "going strong." Nineteen of the twenty-four put into service three years ago are still on the job seven days a week. The real cost of an airplane is the cost per hour of its flying life.

The price of the 40-B4 (Hornet-powered) has just been reduced to $22,500. Planes are completely equipped—no extras to buy . . . Ask for detailed performance figures.

These pioneer air lines use Boeing planes: Aviation Corporation, Barnes and Gorst, Boeing Air Transport, National Air Transport, National Parks Airways, Pacific Air Transport, Varney Air Lines, Western Air Express and Western Canada Airways.

40-B4s ARE AVAILABLE FOR IMMEDIATE DELIVERY.

BOEING

AIRPLANE COMPANY

SEATTLE, WASH.

A division of the United Aircraft and Transport Corporation

(In Canada: Boeing Aircraft of Canada, Ltd., Vancouver, B. C.)

THE PRINCIPLES OF AERODYNAMICS

(*Continued from page* 60)

and the coefficients truly constant only if the flows in question are exactly geometrically similar. Similarity of conditions is not sufficient to make the flows themselves similar. Very primitive arguments lead now to additional conditions that are certain to result in similar flows, and knowledge of them is, of course, of great use because they save us many experiments and uncertainties about the application of model tests. At this point it is well to consider "Reynolds Number," a numerical value almost as void of direct and plastic meaning as a telephone number and used in a similar way.

The problem is this: An airplane model (perfect in scale) "flies" in a wind tunnel and the corresponding full-size airplane flies in the air. The two air flows created, the small one and the large one, will be similar unless the mass forces and the friction forces follow different laws. The mass forces follow the square law, and this is the dominant law in aerodynamics because the mass forces are the dominant forces. The friction forces follow a law even simpler than the square law, but one that is not particularly well known because the air forces are not governed by the friction forces and their law. The friction forces, as such, follow the direct or linear law. The friction forces are directly proportional to the velocities and to the scale or linear dimensions. Experience shows that the proportionality to the velocity or to the velocity differences is a fixed and definite equation. In a very heavy oil a sphere twice as heavy as another falls twice as fast as the latter. The proportionality to the linear dimensions follows directly from this. As the scale increases to twice its original value, all friction forces per unit area become half of their original value, because the velocity differences at the same distance become half as large as before. The areas are four times enlarged, hence the equivalent forces are four times one-half—that is, two times enlarged. Hence, if V denotes the velocity and L the length, the mass forces follow the square law, $V^2 L^2$, and the friction forces follow the direct law, VL. The mass forces remain the same if $V^2 L^2$ remains the same, and the friction forces remain the same if VI remains the same. This, however, is the same condition—viz., the velocity multiplied by the scale must be equal in the two flows compared. The larger scale has to be made up by an equally smaller velocity, and vice versa. If such is the case, both classes of forces remain unchanged. Hence, under these conditions, the enlargement or reduction of the flow does not interfere with the equilibrium between the mass forces and the friction forces. The similar flow, at first only mentally conceived, proves to be physically possible, and is therefore the true and actual flow. The square law holds strictly in this case, because the linear law happens to hold at the same time.

The condition is hardly ever fulfilled with ordinary model tests, the model forces as a rule being smaller than the full-size forces. The rule holds, however, for the same fluid in both cases only. If the fluid is not ordinary air in both cases, the mass forces and friction forces are furthermore increased in the ratio of the density and of the friction of the two fluids. The ratio of friction divided by the density of a fluid is denoted by γ (Greek letter *nu.*) The ratio of the mass forces to the friction forces in different fluids is changed in the ratio

$$\frac{V^2_1\, L^2_1\ \textit{density}\ 1}{V_1\ L_1\ \textit{friction}\ 1} \div \frac{V^2_2\, L^2_2\ \textit{density}\ 2}{V_2\ L_2\ \textit{friction}\ 2} = V_1 L_1/\gamma \div V_2 L_2/\gamma_2$$

There we have Reynolds Numbers. Multiply the velocity and length agreed on, and divide the product by the friction to density ratio. This gives a quantity which, on closer examination, is seen to belong to the class of coefficients. It has no physical dimension, is a pure ratio, and is therefore independent of the consistent units used.

The Reynolds Number has the pecularity that the more one tries to obtain a clear picture of its exact meaning the less one understands it. This is so because it is not merely a coefficient—it is a super-coefficient, by its very nature more indefinite than a coefficient. An ordinary coefficient is the ratio of a true or measured quantity to a computed quantity, and if the computed quantity is universally the same, the coefficient is the quantity itself under certain standard conditions. That is its physical picture. The Reynolds Number is the ratio of two computed forces, both of which are arbitrarily defined. It therefore means nothing, and does not contain anything concrete as long as we are dealing with one Reynolds Number only. If we have two Reynolds Numbers referring to similar conditions, their ratio or rather their comparison means something. They express the existence or absence of "dynamic similarity," as it has been called, of the fact whether the ratio of the mass forces and the ratio of the friction forces are the same.

The idea of Reynolds Numbers is comparison and identification. They therefore might be compared with street numbers. One street number means nothing in particular. Two street numbers indicate how two houses in the same street are located in relation to each other. That is their chief significance. A secondary and unreliable significance is the conclusion that the house with the larger number is probably farther away from downtown. Similarly, it can in a general way be concluded that with a larger Reynolds Number the influence of the friction is probably smaller, but this cannot be depended on.

The practical application of Reynolds Numbers is not vague at all. The variable density wind tunnel at Langley Field (designed by and constructed under the direction of Dr. Munk—Editor) contains more than fifty tons of steel, is under pressure of more than 25 atmospheres (360 pounds per square inch), and is the largest unbraced container in the world designed to withstand such a pressure. It contains a wind tunnel operating with highly compressed air. It has no scale effect because it uses comparatively more air than the size of the model would suggest, and therefore the square law holds exactly between model and full-scale airplane. The use of such a tunnel would not help at all if the friction of the air increased with its density, but we know that it does not increase.

The knowledge of Reynolds' friction law referring to the validity of the square law eliminates many useless tests, for if we know beforehand the square law will hold, we can save the test and compute the result. The number of variables to be investigated with every shape is reduced from three to one—from velocity, length and fluid to the Reynolds Number. If coefficients are variable, they should be plotted against the Reynolds Number, for they are then certain to form a curve rather than give us what looks like a sky of stars on our plotting paper. The same result will be obtained if they are plottted against any mathematical function of the Reynolds Number—for instance, against its square root rather than against the Reynolds Number itself. The meaning of the Reynolds Number is indeed so vague that any of its functions gives the same service as the Reynolds Number itself, and could be used to the same advantage. This makes it again evident how futile it is to try to obtain a clear picture of the exact

(*Continued on following page*)

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meaning of the Reynolds Number, even though convention has given it a special name.

To compute the Reynolds Number in standard air, multiply the velocity in inches per second by the specified length in inches by 45, for γ is equal to 1/45 square inches per second. The dynamic friction γ has the physical dimension area per time; it is the rate of mixing or spreading out. The value in metric units is 1/7 square centimeters per second. The Reynolds Numbers of the practice go generally in the millions, because the velocities are large when measured in inches per second (an inch is also a small unit for length measurements) and the product is then still multiplied by 45. The numerical magnitude again demonstrates the absence of a distinct physical picture.

The present article is the last one of the series which is general in character. In subsequent articles we shall make quick progress towards approaching real drafting room problems. The amount of actual knowledge presented in this article is relatively small, which, after all, is the best that can be said of an article about air friction. But the discussion is perhaps the more valuable because it emphasizes the state of our ignorance rather than the state of our knowledge. If it does so, it fulfills its purpose. Evidence about ignorance is as important as evidence about knowledge; it relieves us from an inferiority complex and directs our efforts toward creating the knowledge ourselves rather than looking for it vainly in institutions of learning and literature. Indeed, the domain of ignorance is even more attractive in many respects than the domain of knowledge because it is the domain of future progress. It is a field with treasures buried, a door to success and conquest. Ignorance is bliss, not only in the philosophical sense, but also because the knowledge that lights ignorance is sweeter than the knowledge that is taken from the schoolbook; it is the substance that makes life great.

This is the fifth and concluding article of a series on the general principles of Aerodynamics. In subsequent articles, Dr. Munk will treat more specialized problems in this field.

AERIAL OBSERVERS IN FOREST SERVICE

(*Continued from page* 52)

scheduled runs. Only a few days later one of the F-32 Fokkers, on schedule between San Francisco and Los Angeles, spotted and reported a fire in the vicinity of Le Bec toward Frazier Mountain Park. By means of the ship's radio, Pilot Hal Holloway notified the Los Angeles office, and immediate investigation and action was taken to bring the fire under control before it had spread to any extent.

All the transport lines in the West have signified their coöperation with the U. S. Forest Service fight against forest fires, by requesting their pilots to report any fires seen from their planes, and it is estimated that thousands of dollars of national timber land will be saved this year through this coöperation.

SURMOUNTING NEW GUINEA'S BARRIERS

(*Continued from page* 44)

scratched, though for many dreary hours he was a prisoner in the tree-tops, over a hundred feet from the ground. Finally a searching plane located him and brought food and ropes. The engine, however, was not damaged, and the owners managed to get it out of the tree after a vast amount of labor. This absence of loss of life or serious accident is rather remarkable especially when it is remembered that the pilots often have to fly through blinding rainstorms among towering mountains, where the slightest deviation from the correct course would mean a head-on collision against the walls of some narrow gorge. Indeed, this record of safety can only be accounted for by the superb skill of the pilots, most of whom learned their job during the red years of the Great War.

The machines handle all sorts of freight. One miner, eager to have real milk for his coffee, willingly paid the freight rate—twenty-four cents a pound—for a milch goat. Another man, who was in a hurry to transport his cook, a youth of twenty, to his claim in the interior, cheerfully agreed to have him weighed and freighted for the same price. Fortunately, since the youth only scaled 120 pounds, his master was not unduly mulcted for his transport.

The airplane has undoubtedly solved the problem of transport in the roadless parts of the world. The service has now been operating for nearly three years in New Guinea, where it has flown many hundred thousand miles without a fatality, all the machines, except one, being single-engined; has maintained a regular time table, except when unavoidable weather conditions made flying impossible; and has, incidentally, made life very much more tolerable for the sturdy pioneers who are laying well and truly the foundations of civilization in the wilderness of central New Guinea.

LUFT HANSA ENGINEERING

(*Continued from page* 61)

manufacturer only occasionally. When the airplane goes into the shop, however, it is again observed more closely. When an order for five or ten planes is given, it is usual that an engineer be assigned to the factory to oversee their construction personally. This is in addition to the usual systematic checking carried out by the checking department and the D.V.L., which corresponds to our Department of Commerce. The checking department is responsible only for workmanship and good practice; technical details are left to the engineering department.

When the plane is finally finished, it is checked over for many technical details by an engineer attached to the office of the technical director, usually Herr Achterberg. A representative of each of the subdivisions of the engineering department goes over the airplane, after which it is turned over to the checking department. If the ship is satisfactory, flight tests are made by the engineering section. These tests are conducted by three engineers representing each of the subdivisions of the engineering department. Each of these engineers is responsible to Herr Achterberg. The reports of these men are assembled, and if there are any changes to be made, conferences are held with the manufacturer. The final acceptance is made by the technical director.

In service, the new airplane is used for freight only for about the first half year, or approximately 300 hours. During this time, if it is a new type it is carefully watched by the engineering department which checks it over every fifty hours until the top overhaul at 150 hours. This overhaul is usually made with a representative of the airplane manufacturer present. When the airplane is in actual service, it is usual for a member of the engineering department to go along on flights and thus observe the plane under actual operating conditions.

Experience with the airplane in service is digested, and the results are forwarded to the aircraft manufacturer so that it too may profit by the experience gained with each new type.

(*Continued on next page*)

(*Continued from preceding page*)

The checking in service is under the supervision of the technical director, and checkers go from plane to plane, following up the airplanes and checking them over at regular intervals.

After 150 hours, there is a main check of the airplane; between 400 and 500 hours there is a main overhaul. This time varies, depending upon the type.

The engineering section, in addition to assisting in the purchase of new equipment, digests the records of the service department, and helps to draw up specifications to keep the airplanes in proper condition. The checking department is, however, responsible in itself for the condition of the airplanes.

When an airplane is in service, minor repairs are carried out by the service department, but any major matter is referred to the engineering department. When there are changes to be made on airplanes which are in service, it is logical also that this should come under the engineering department.

In order to save time, there is a small design office maintained at Staaken with about two engineers of each section. The engineering department does only a little design work on remodeling or rebuilding airplanes. The main work of this nature is done by the manufacturer of the airplane.

All major repairs on landplanes are done at Boblingen or at Staaken, the greatest part of the work being done at the latter place.

All planes have their own logs, and these reports are assembled by the checking department, after which they are turned over to the engineering department.

Work is so arranged that most of the repair work is done in the winter when the flying schedules are somewhat curtailed.

ELMIRA, AMERICA'S WASSERKUPPE

(*Continued from page 49*)

Kondor was ready for a flight. To say there was a wind at all would have been a mistake, much less to speculate on its intensity. Smoke from the old pipe drifted leisurely upward as in a room.

"What's this to be, Jack," I asked, "A non-stop to the airport?" "Looks like it" he replied as he prepared to take his place in the slim fuselage. A new idea seemed to come to him, for he came over to where I had taken my position to get a picture of the take-off. "Now, listen" said Jack, "As far as the crowd is concerned, I'm heading for the airport, but between you and me I think I can soar over this ridge right now. I've only flown the Kondor once before, at the airport, but the way my Cadet worked over this mountain, I think I can do it."

Although pleased to be taken into confidence, I must confess I felt Jack's enthusiasm was running off with his better judgment. "Walk! Run! Let Go!" and up darted the Kondor under the power of twenty men and 400 feet of launching cord. Out over the ridge, her long, thin wings silhouetted against the blue sky. For a time she seemed to lose just a little altitude, then the almost miraculous climb began. At the end of the course, a full fifty feet had been gained and when she came back overhead she was at least seventy-five feet higher. Jack tauntingly shouted down:

"I'm Hawley Bowlus. Who are you?"

Bowlus seemed amused at this remark and absolutely astounded at soaring under the existing conditions. Finally he said, "I know what it is. You fellows have sticky air up here!"

O'Meara seemed to have better control of his mount than his enthusiasm, for each time he reappeared over the starting point, he was either triumphantly singing, shouting, or calling out to Eddie Allen to take his Cadet II off. Appropriately enough, one of his vocal outbursts was "I'm drifting along with the breeze." At another time he stood up in the cockpit and drank water from a thermos bottle and after that dipped a salute to the onlookers.

For an hour and a quarter this flight lasted, finally being terminated only by a jammed control. At times a light wind was felt, but more often it seemed absolutely calm. Everyone marveled at the demonstration. It was generally agreed that thermal or heat currents were responsible, but the soaring was done over a thickly wooded ridge which was dark green in color, whereas thermal currents are invariably found over white sandy formations. The center of the valley, some two to three miles distant, however, was in general of a lighter color than the surrounding ridges. This seemed to furnish a plausible explanation.

As the thermal currents were created in the valley by the sun's rays they rose gradually, perhaps not more than a few inches per second. Under the gentle drifting of the light wind, they came against the south mountain ridge, which towered 800 feet above the valley. Here they were concentrated in a restricted area and increased their intensity to perhaps three feet per second. It is noteworthy that although there seemed to be no appreciable wind, the soarable area was quite a narrow region about forty-five degrees off from the top of the ridge. Attempts to soar out farther over the valley or back farther from the ridge were not successful. At any rate, the Kondor with a gliding angle of about twenty, and a sinking speed of about two and one-half feet per second, found soarable conditions for well over an hour.

Considerable anxiety was felt for O'Meara's safety when he failed to appear after a last glimpse back of the tree tops at a low altitude, but Hirth took off and soon came back overhead, reporting that a safe landing had been made in the valley. Hirth's time was close to an hour indicating that the soarable conditions described lasted for considerable time. His flight terminated as the sun began to sink near the horizon.

Saturday, September 27th, brought about Hirth's flight of seven hours, seven minutes and two seconds, with a landing back at the starting point. The take-off was Watercure Hill on the east ridge, and all day long the skillful pilot and the beautiful Kassel-built soarer cruised back and forth over the course from ten to twelve miles long.. From Watercure Hill one could barely see the activities taking place at Monument Hill. Three or four gliders were in the air most of the time. Even colors lost their effectiveness as an aid to identifying the various machines.

Sunday also brought about much flying, but because of a wind change, Location 6 was used. From two to four ships were in the air throughout the afternoon. Wednesday, October 1st, was another outstanding day of the meet. On this occasion Jack O'Meara in a Cadet II lowered sandwiches on a 300-foot fish line to Wally Backus, flying a Franklin PS-2. A small fishing reel was employed and great skill was required to maneuver the motorless craft in position. This appears to be the first time such a feat has been attempted.

As a fitting grand finale to the meet, the wind shifted on Saturday, October 4th, to permit the use of South Mountain, known as Location 8a. By this time, pilots and mechanics were familiar with routes, locations, winds, etc. After an early breakfast trailers were trundling up the mountain roads. The roar of overheated engines, and the

(*Continued on following page*)

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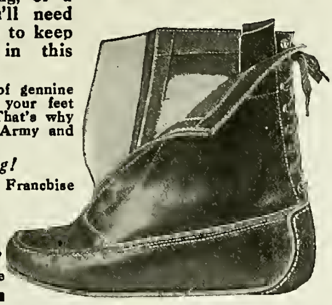

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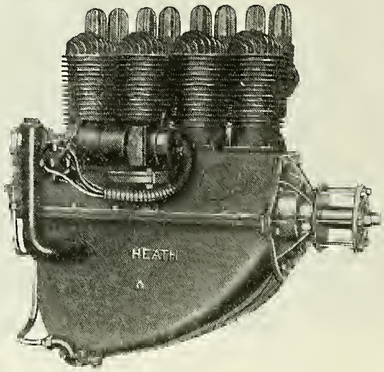

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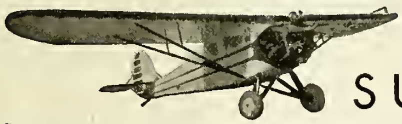

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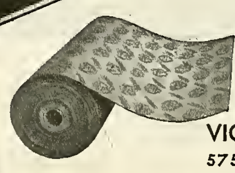

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(*Continued from preceding page*)

steam spouting from the radiator caps of the towing cars reminded one that gravity exacts a price from even motorless craft. On the location, lines of cars had formed and ships were rapidly being assembled. The Paramount Movietone crew was on hand, and Captain Hawks gave a short explanation of the meet. After this, with the dispatch of a transport system, ship after ship took the air. It was even necessary to wait for soaring ships to pass before launching a new entrant. We were all so busy with the launchings that it was not until Ken Doe took his Cadet off that we realized that every ship on location was in the air. Formation flying had been talked about, but it was thought rather fanciful and perhaps dangerous. The pilots must have completed the discussion by shouting back and forth while flying for in a little while the grouping seemed to be taking shape. One more trip down the course, and back they came. We counted—one, two, three, four, five, six, seven! Seven gliders in formation and all American-built utility types. Hirth and Haller had struck out for distance in their soarers and were lost to view. Captain Pippig, German war ace and soaring pilot, smiled and remarked, "Now it's like the Wasserkuppe."

As the afternoon progressed more and more attention was directed to the Franklin flown by Albert Hastings of Los Angeles and the Cadet II flown by Warren Eaton of Norwich, New York. They flew high and usually together like Ralph Johnston and Arch Hoxey of old, who were christened the "Heavenly Twins" because of their altitude flights in their Wright pushers.

The sun settled and the air became chilly. Reports came through that Both Hirth and Haller were down. Other pilots had landed back on location or glided to the airport to try for the spot landing. Captain Hawks was climbing his Eaglet in an airplane towed flight over the airport. The ranks of the observers thinned as caravans of cars rumbled down the narrow roads. But still Hastings and Eaton flew on. Down at the airport officials were busy recording landing measurements as the great mechanical birds came in for the night. The moon appeared and from the airport one could occasionally see the two contestants silhouetted against it. Not until nearly an hour later did Eaton strike out for the airport where he made a landing in the twilight. Hastings followed soon after with a duration of seven hours, forty-three minutes, and eleven seconds. Eaton's time was seven hours, twenty-one minutes, and thirty-eight seconds.

The meet was ended except for calibration of instruments and checking of records. It had been a real success and Elmira had earned the name of America's Wasserkuppe

A RUMPUS OVER RECORDS

(*Continued from page* 39)

of course, duly hailed the performance, but to this day the N.A.A. protests it has no official knowledge of the performance and therefore the achievement is "no record."

On June 29, 1929, ten days after the F.A.I. reluctantly had conceded the airwoman's right to a separate category of records, Phoebe Omlie, one of the best known woman fliers in America, took a Monocoupe to a height of 17,467 feet at Moline, Illinois. The barograph she carried was forwarded to and calibrated by the Bureau of Standards which set the stamp of its approval on the flight. Again the local representative of the N.A.A. was in charge and presumably did everything necessary to make the performance official, but N.A.A. headquarters in Washington takes refuge in the statement that "no report ever was submitted."

Only a few weeks ago in California still another woman flier, the inimitable "Pancho" Barnes, shattered all speed records for her sex by flying at the rate of 196 miles an hour over a mile straightaway course. Neither Mrs. Barnes nor the National Aeronautic Association representative, who supervised this performance, apparently was aware that the mile course no longer is accepted as official by the F.A.I. and its American satellite, the N.A.A., so this was just another honest effort gone for naught.

In sharp contrast to the difficulty with which American woman fliers are confronted in getting official recognition for their record-breaking flights, is the celerity with which such achievements are authenticated and certified in Europe. Two outstanding examples are the recent endurance flights of Mlle. Lena Bernstein and Mlle. Maryse Bastie, former and present record holders, respectively, in this field.

It isn't strange, in view of all this, that the cold cream division of American aviation is turning sour on the National Aeronautic Association. Nor that the suggestion of turning over to some other organization, such as the National Air Pilots' Association, the functions in which the N.A.A. so clearly is falling short, is finding fertile soil. Obviously there is something fundamentally wrong with any organization whose own members are so dissatisfied with its method of functioning and the various representatives of which throughout the country are so incompetent or so poorly informed on the duties expected of them when they are called upon to observe and report upon record flights. It is not a sufficient excuse for the N.A.A. to say that a record was thrown out because of "incomplete reports"; it should be the business of that organization and the officials of its local chapters to see that complete reports are made and that everything else is done to safeguard the interests of the flier who goes out after a new world record.

One other phase of the record rumpus merits comment for the reason that it has been raised as a possible explanation of the difficulties met by pilots out after new marks. This is the fact that, when an official observer of the N.A.A is summoned from Washington and paid at the rate of twenty-five dollars a day and expenses to supervise a record-breaking performance, there is rarely any delay in recognition of the record. Only recently the N.A.A. adopted a resolution calling for the appointment of several such twenty-five-dollar-a-day "official representatives" throughout the country, although, in official correspondence and otherwise, it heretofore has held that officials of the various local N.A.A. chapters, who frequently are interested enough to volunteer their services free, were adequate. Quite obviously, the reason for records going through unquestioned when attested to by highly-paid observers, may

(*Continued on following page*)

be that the latter do their work thoroughly and efficiently, whereas the volunteer worker blunders into one mistake after another. But the nasty implication remains that "hired help" is being encouraged for selfish reasons and at the expense of pilots who ought to be burdened only with the responsibility of bringing new records to the United States.

AIR—HOT AND OTHERWISE

(*Continued from page* 50)

desirable and responsible bidders from the undesirable and irresponsible.

It seems obvious now that the Watres Act should be further amended. Clearly the Postmaster General has more power than is desirable or safe. It was not the intention of the framers of the act that he, or even the department over which he presides, should be so placed that they could, as they now can, compel mergers, force sales of certain companies to others, and exercise comparable dictatorship over other vital matters affecting private property.

The Postmaster General, today, has far greater powers than he should have, and rumors reach me from reliable sources that he has used and contemplates using them to the fullest degree.

Maybe it will work out advantageously. I hope, for the good of the contractors, as well as for the best interests of the Government, that it will. But being an American of Irish extraction and speaking and drinking Scotch, "I ha'e me doots."

The situation as it stands is, at any rate, interesting. We shall watch it with close attention, keeping our ears to the ground, our eyes in the air and our fingers on the keyboard of our typewriter.

A NUMBER of interesting questions inevitably suggest themselves. Write what YOU think are the answers to the following upon your desk-pad and later see just how nearly right you would have been if you had publicly stated them as your belief. Here are the questions:

Does the volume of air mail warrant three competing transcontinental lines?

Were two of these lines legally formed and will the Comptroller General make payments to them?

In view of the President's economy program, is it likely that appropriations for air mail by the next Congress will be large enough for the support of three transcontinental lines with feeders under the provisions of the Watres Act?

To what extent are the new air mail lines now embrined as rewards of political merit in the official pork barrel?

To what extent have the numerous stops for the through mail routes been dictated by politicians?

With air mail rates readjustable by the Post Office Department on the first of any calendar year, is it not likely that, in case a campaign of promotion increases passenger profits, the Post Office Department will revise mail rates downward? Is not this probability so great that any notable effort to increase passenger business must be considered unjustifiable?

To what extent has the Postmaster General been induced to bail out companies unwisely formed and backed by unwise investors at the expense of the real pioneers among equipment companies and transport lines?

How great will be the catastrophe if the Postmaster General's scheme fails to work out as various influences have led him to expect it will?

Upon what food doth this, our Caesar, feed, that he should be so great?

THE EMPIRE IN THE AIR

(*Continued from page* 36)

Transport Corporation.

Need more be said? The accident which befell the R.100 was responsible for bringing to light a good deal of what the British people purport to see behind this new international alliance of the air.

Now it may be asked, "Is there anything really so very serious in all this?" No, not necessarily. AERO DIGEST, in presenting the facts of the show behind the show at St. Hubert Airport, near Montreal in the Province of Quebec, has no intention of setting up a cry of jingo-ism. National commerce must take its commercial allies where it finds them. The facts in this case are that in the development of "lighter-than-air" Germany is the ally of the United States, and Great Britain is committed to a policy to concede no superiority to German dirigible traffic.

Although we have come to see that wars frequently develop from such commercial alliances and aspirations, there can be no great danger in the present situation except ignorance of the condition. And there is apparently plenty of ignorance of this new alliance on the part of the American people, although I found most Canadians perfectly aware of the situation. A few days after the arrival of the R.100, no less a journalist and political commentator than Calvin Coolidge, our former President, viewed the feat of the R.100 in one of his daily newspaper articles both with pride and with alarm, saying that once again we had shown to be inferior to Europe in the matter of aviation. Here in this writing, as in the thought and talk of most Americans, is apparently complete ignorance of the tie which our commerce has made with German airship interests, and all of the significance which this may mean in the future.

SWING LOW, SWEET CHARIOT

(*Continued from page* 47)

learn the feel of the plane under conditions where I was not likely to get into trouble. But that hill was unavailable, due to wind direction, so I didn't get a chance.

Jack O'Meara very kindly made the generous gesture of offering me the use of his glider on the soaring hill—hoping I wouldn't accept, I suppose. I asked him if he was tired of the machine and wanted it broken up. I suppose if I'd tried it more likely than not I'd have got away with it all right—even if I couldn't have soared, I haven't much doubt that I could have glided down to the valley. But that isn't the idea at all. In this gliding and soaring, as in powered airplane flying, it should never be a question of what you can "probably" do; it should be an answer of what you can *certainly* do with safety, after adequate training and preparation. For me to have spent the past year writing aeronautical safety bulletins and then to go and plaster myself and a glider up against the southern exposure of somebody's cow would have been the height of absurdity. I at least take my own advice! I'm not doing any soaring until I've done more gliding—and I suggest that the same attitude on the part of airplane pilots will save some wear and tear on their systems.

You see, a man doing soaring is really flying on his wits. And as many a man who has tried to live by his wits has gone bankrupt for lack of capital, so many a gent who tries to fly by his wits not infrequently finds himself running on a dry tank. Soaring consists largely of the business of matching grey matter against gravity. So we have the equation Wind plus Wits equals Altitude.

Which is not to say that soaring is dangerous. My own opinion, gained not from personal experience but from ob-

(*Continued on following page*)

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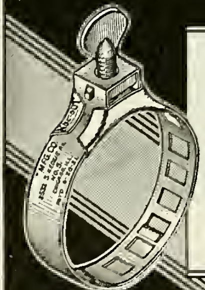

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(*Continued from preceding page*)

servation of others' soaring, is that gliding and soaring are safer than flying in powered ships, *but only if a pilot avails himself of actual knowledge of the subject and proceeds with caution,* taking advantage of the experience gained by those who have been at the art for some time. Failing this important prerequisite, I am of the opinion that both gliding and soaring are more dangerous than powered flight. For in an airplane a man would not think of going solo until he had received competent instruction in the air. But in a glider his very first flight must be a solo flight. Therefore he must not only get all the instruction he can on the ground before he takes off; he must proceed with his air work in the easy and safe stages that long experience has proved to glider experts are needful. To the beginner in gliding, and also to the experienced power plane pilot, I would suggest studying several books on the subject and then start your air work under the direction of an experienced *glider* pilot. There's a vast difference between a Wasp engine and one that runs solely on wits and wind.

The method employed to launch those ships at Elmira was the shock cord. Two or four lines of cord were stretched ahead of the soarer some 200 feet, and to the ends attached themselves from ten to twenty good men and true. They were the engine. There's no engine *in* a glider, but there's an engine of from ten to twenty man-power ahead of it on the ground. At the command, "Walk," this automotive department tramps ahead, stretching the cords in an even V from the nose of the glider. At the shout, "RUN!" the engine pounds the earth with its poor, tired feet, and goes charging down the slope, the glider or soarer meanwhile being held back by a human anchor composed of from two to five shivering mortals who are trying to find a place in aviation. At the command, "LET GO!" the anchor drops the rope and falls backward on its pants, while the twenty man-power engine goes careering ahead, still further to prolong the motive force of the shock cord—so called because if it ever catches up with the engine it will administer a terrific shock to whatever section happens to be turned toward the rear.

The power the glider is to use is the tension of the shock cord, stored up by the above stretching process; and as it is sufficient to jerk that glider from a stationary position on the ground and to hurl it at some thirty miles an hour into the air, you have a faint idea of the force of the blow that could be—and often is—administered to the seat of a pair of trousers adorning the anatomy of an aviation aspirant forming part of the engine—the rear connecting-rod, we might say.

I saw one young gentleman who achieved the exalted position of "End Man" on the shock cord; and the immediate reward he received for his labors was that the rebounding cord gave him a pat on the rear that advanced his aviating career about a hundred yards straight ahead and into a line of dense underbrush that gave him something else to think of. Another engine part—a red-headed farm hand from a nearby cows' boarding house—raced and pulled with might and main, not wisely but too well, with the startling result that when the tension was released he shot forward on his face and did some fall plowing with his nose.

All of which warned me—who am not by nature entirely unobservant of the laws of cause and effect—to stay off the mobile end of the business, and to leave that dubious place in aviation to the younger and tougher element. The young heal quicker than the old. Whenever the clarion call echoed among the hills, "MORE MEN ON THE SHOCK CORD!" I would either disappear entirely or proclaim that I was a Paid Watcher, determined to maintain the fair status of a Paid Watcher, come what might. I did help them, though. When the call for men came, I would grasp some pop-eyed young yokel and lay my hand paternally on his shoulder. Gazing at him earnestly, with all the seriousness of Walter Hinton himself, I would declaim, "AVIATION HAS A PLACE FOR YOU!" and point to the shock cord. God forgive me! I sent several young men to their doom of plowing up the State of New York with their faces or hewing down the forests with their shoulders and legs.

Seriously, though, I urge that some better and less painful launching method be devised than that now in use. It is somewhat dangerous to the launching crew. For proof, witness one young man in an Elmira hospital with a dislocated shoulder, and Samuel Saidman, Esquire, of the D.C. Air Legion, Washington, D. C., with a collection of black and blue marks that would charm the eye of a rubber in a Turkish bath, who gets tired of looking at the human form usually unadorned by any such pictorial representation of conflict with a hard world. Sam says he looks as though he'd been having an argument with an army tank, followed by a debate with a steam roller. Not infrequently that rebounding shock cord acts with all the venom of an infuriated boa constrictor, writhing around the victim and hurling him to the ground. It seems that a simple catapult affair could be devised to launch a glider without such mutilation of limb and flesh.

The glider or soarer—the terms are used interchangeably here—soars into the air from the little field on the top of the hill. It sails out and over the edge of the valley, but almost immediately the pilot turns it at right angles to the hill, and at right angles to the wind, and goes sailing along the edge of the ridge. It is a cross-wind turn and a cross-wind flight from then on, unless the pilot gets into thermal currents.

I find that few people yet know how soaring is done—the general impression being that a soarer soars because it is a soarer—so I'll try to explain it. You soar for only one reason, and that is because your ship is in an ascending air current. In still air, or in a wind that blows along level ground, you cannot gain altitude or even stay in the air. Of course, in a strong wind a glider could be held by a rope and flown as a kite, but that would not be soaring. It would be "kiting," which a glider is doing when towed aloft by means of a cable attached to an automobile in motion.

To soar, you find a terrain where the wind is blowing across a valley, encounters a ridge of from a hundred to several hundreds of feet high, and is deflected upward. Now, wind doesn't blow either up or down or around—except in a cyclone. It blows straight along. However, if it meets an obstruction, such as a high ridge, it cannot blow straight along; it is forced to move up the slope of the hill—which of necessity makes it an ascending current at that point When it passes that ridge, it becomes a descending current into the next valley. You've seen water running swiftly down a shallow river bed? When that current of water encounters a stone, it goes over it, curving upward and over, and dropping down over the other side of the stone. Well, the air current does the same thing going over a ridge—goes upward on the windward side, and downward on the leeward side. Wind passing over the prairies goes straight along, but wind passing over a series of ridges goes up and down, very much like the waves of the sea.

And it is one of those waves of air you ride in your

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soarer. You take off directly into the wind, but, once you are up, you must turn to ride along that wave. You must keep in the wave, along the ridge, for once you are out of it you must glide down—unless you encounter other waves that bear you upward, or thermal currents, which are rising columns of warm air usually encountered under clouds. Understand that your soarer or glider is not flying upward itself—it is flying downward, always. It must fly precisely as an airplane flies, by maintaining forward speed, so that its wings will have a lifting effect. It gets that forward speed by nosing down and gliding toward the earth, exactly as an airplane must do when its motor is idling or shut off.

However, while your glider is going *down* all the time, the air in which it is flying is going *up*. It is like walking down an escalator that is going up. If the air is going up faster than the glider is going down, then the glider gains altitude. If the air current is not rising as rapidly as the glider is descending, then of course the glider must land. However, as some soarers descend at the rate of only one foot for every twenty-eight feet of forward travel, it should be readily apparent, even to that little boy at the rear of the class-room, that if there is any sort of a good breeze in suitable soaring country, one should be able to soar and soar until tired of the sport.

At Elmira, the only reason any pilots landed during one of the days was because they were tired—and after from four to seven hours of sailing back and forth across one ridge, who wouldn't be tired? Given a steady wind, a soarer could remain aloft so long as that wind continued. Soaring records over one spot are dependent upon wind and stamina. Distance records, however, are dependent upon a rare combination of fortunate winds, suitable terrain and the skill of the pilot. It is a complicated and fascinating sport. A pilot might fly twenty miles along a ridge, and do it very easily. On the other hand, it might require rare skill to fly a quarter the distance by hopping from one current to another. Wallace Backus, for example, displayed very expert airmanship when he gradually gained a high altitude above Hill Six, then apparently caught thermal currents, and ended some six miles away.

Wally, by the way, is one of the Polar Bear boys—no cap, open roadster, impervious to cold. Nature, noticing that there was something the matter with him, has done her best to cover him up with hair, trying, in spite of him, to protect him from the cold. She's grown twice the normal quantity of hair on his head, and even shoved it down on his forehead to keep his mind warm. If I ever ride those wind-swept hills with him again, I hope that he turns in that roadster and gets a sedan. I still have the pioneer spirit—I like a covered wagon.

Professor R. E. Franklin and Kenneth Doe did their first soaring at Elmira and gained their soaring licenses. They stayed up for hours. Warren E. Eaton also gained his soaring license there, though I believe he'd soared before. All three went off and soared apparently with the greatest ease; they had prepared for it with much time spent in gliding and came there equipped with a good training. That, to my mind, is the essential requirement—careful preparation. I stress it because I can foresee a lot of grief coming to those who merely dash boldly in where only experienced glider pilots should tread. It doesn't take long to get the glider training, especially if you already fly powered planes. Glide low before you soar high.

By the way, if some of you six readers are going to glide and want an instructional booklet, write to me and I'll send you gratis a copy of GLIDER FLYING prepared and distributed in the interests of aviation safety by the United States Aviation Underwriters, Incorporated. They sent this booklet to all licensed pilots, and have a few hundred extra copies on hand. After you've read the booklet, take its advice and go to a good glider school, or have a competent instructor. Don't simpl ytry to learn to glide from a book—it can't be done. The book is only a help.

Old-time soarers like Wolfram K. E. Hirth, Gus Haller and Captain Fred A. Pippig from Germany went up and did some beautiful work. The graceful turns executed by Hirth, especially, were a joy to watch. To see that wonderful big soarer of his sailing around you'd think there was a motor in it. It was a Segel soaring plane, or *Flugzeugbau,* made at Kassel, Germany. Clever fellows, those Germans. It takes a lot of ability and practice even to say *Flugzeugbau,* let alone to soar it.

Albert E. Hastings, who runs a glider school in Los Angeles, Lieut. Ralph S. Barnaby, U. S. Navy, Hawley Bowlus and Dr. Klemperer, all old-timers, were there. The two latter had bad luck before I arrived, so I didn't have the pleasure of watching them fly—or land. That's the part I really would have liked to see, the landings. From all accounts, they were worth watching. Doc is now designing a personal tail skid for glider pilots, as the wear and tear on a Hart, Schaffner & Marx after a Klemperer descent is too costly—and it isn't every suit that comes with two pairs of pants. Hawley seems to have run out of up currents, and was forced to descend in a small field, hitting a fence or wires. There appears to be a field for Senator Borah's peculiar talents at these meets, providing thermal conditions for gliders. Just get over one of Borah's speeches and you could stay up indefinitely, blown up by Borah.

The experts tell me the country about Elmira is ideal for soaring. No matter from what direction the wind may be coming, at least one of several hills will be facing it, lying there to deflect the breeze upward into one of those ascending currents so much desired by the oldest and most respectable soaring pilots. Spread out before you are broad, pleasant valleys with fields green and brown, inviting you to swing low and land. Stretching away from you on all sides are ridges and hills, some with gentle inclines, others with sides so steep that the more cautious cattle, before venturing a descent, beg the thoughtful farmer to equip them with Bendix brakes.

As the time drew on toward evening of my last day in that pleasant country, there were four soarers in the air, circling back and forth. As though for companionship, they drew nearer and nearer to each other, finally taking up a perfect diamond formation, and flying along together as closely and surely as four powered airplanes might have done. In this close formation they made several rounds of the course, and then, as gathering dusk descended, they swung apart and one by one flew out over the broad valley, out of the influence of the ascending currents. Around and around, dropping lower and lower, they circled. Soon they were below the level of the ridge on which we stood; but from our high vantage point we could follow them as they made their graceful circles of soundless flight into the deepening dusk of the valley. Above them a lone hawk, soaring in narrowing circles and ever dropping down, seemed to be waiting until the last of those other strange birds should land before he, too, settled down to rest.

STATEMENT OF OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS, AUGUST 24, 1912,

of AERO DIGEST, published monthly at New York, N. Y., for October 1, 1930.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Frank A. Tichenor, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the AERO DIGEST, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

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(*Continued from page* 56)

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Mobilgrease say Curtiss-Wright

The Curtiss-Wright Flying Service operating schools, maintenance and repair depots, and flying services on 31 airports from Maine to California have standardized on Mobilgrease for rocker-arm lubrication.

Half as much Mobilgrease serves twice as long as any similar lubricant.

Lubrication experts knew it. Engine builders found it out. Now *you* can prove it to your own satisfaction.

Whenever and wherever you have your engine serviced, specify Mobilgrease for the rocker arms.

CURTISS-WRIGHT FLYING SERVICE
NATIONAL COMMERCIAL FLYING SCHOOLS, SALES & SERVICE

A DIVISION OF CURTISS WRIGHT CORPORATION

NEW YORK OFFICE

September 25, 1930

Mr. R. W. Lake,
Vacuum Oil Company,
61 Broadway,
New York City.

Gentlemen:—

We have used various rocker arm lubricants for aircraft rockerarm lubrication.

We have found Mobilgrease Rocker Arm Lubricant to more than fulfil all our requirements, and have decided to use it exclusively at all our bases in our own operations. The accessory stores in each of our bases will also stock Mobilgrease for re-sale.

Very truly yours,

CURTISS WRIGHT FLYING SERVICE

Lee D. Warrender

Lee D. Warrender,
General Service Manager.

Curtiss-Wright Flying Service maintains Authorized Service for Curtiss and Wright engines at all of their bases. Mobilgrease is their approved rocker-arm lubricant.

Mobilgrease is remarkable, not only for its economy in use but for the unequalled lubrication it provides under heavy pressures and high temperatures.

Winter Flying — Lubrication Warning—Mobiloil Aero "W," a special "double-range" winter lubricant, has been developed for winter protection of aircraft engines. It flows readily at low temperatures, but maintains its rich lubricating quality under the heat of operating conditions. Where ground temperatures below freezing (32°F.) predominate, Aero "W" is recommended.

In cold weather, if Mobilgrease and the grease gun are kept in a warm place, at about summer temperatures, before using, servicing will be greatly facilitated.

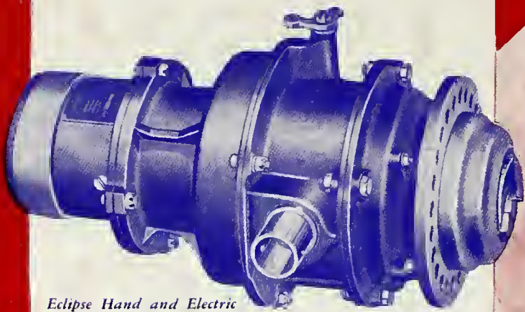
VACUUM OIL COMPANY

Makers of high quality lubricants for all types of machinery

GARGOYLE

Mobiloil AERO OILS

FOR ROCKER-ARM LUBRICATION USE MOBILGREASE



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Start With Ease

Eclipse Electric Starters, either direct cranking or inertia type, bring to your plane the utmost in starting convenience.

On the ground or in the air, operation of the starter button is the only effort required to obtain a safe, quick and effective start. The high cranking speed afforded by Eclipse starters insures starting under most adverse conditions.

Eclipse starters are backed by fourteen years of experience and production. Write for full information, stating engine in which you are interested.

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AVIATION STARTERS AND GENERATORS

ECLIPSE AVIATION CORPORATION
East Orange, New Jersey
(Division of Bendix Aviation Corporation)

December, 1930 · · 35 CENTS

AERO DIGEST

THE AUTOGIRO
by Juan de la Cierva

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College Flying

SPEED—by Frank M. Hawks

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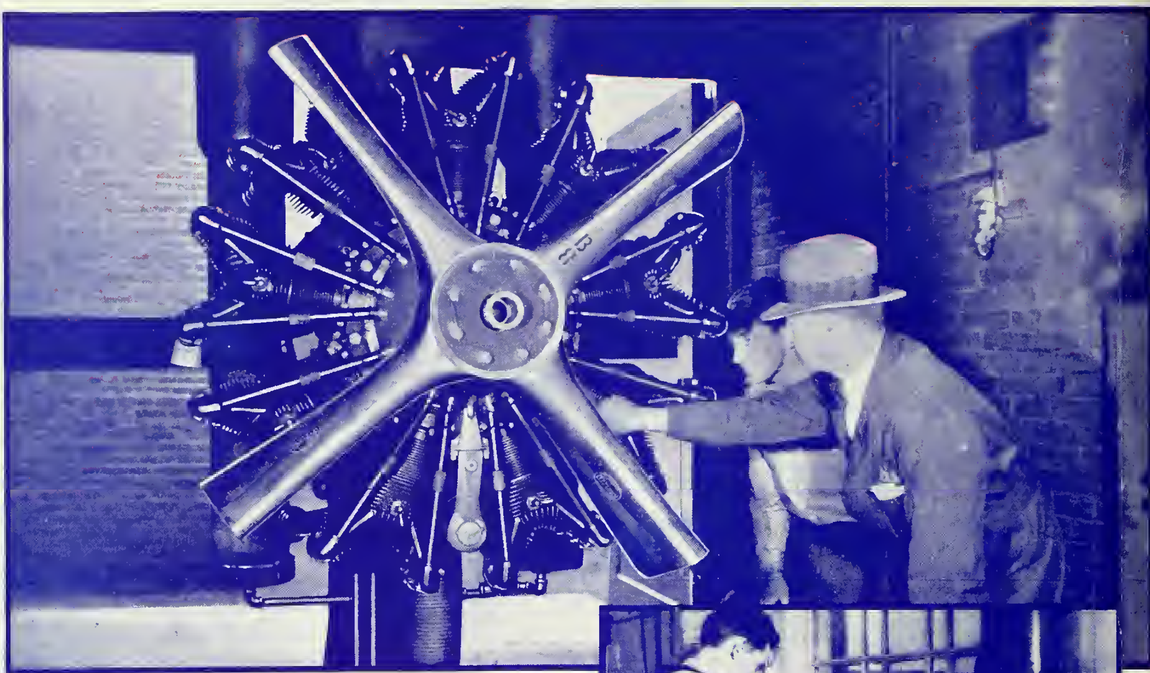
Aerochronology of 1930

FINAL TEST AT FULL THROTTLE



ACTIVE life for each Pratt & Whitney engine starts immediately after its assembly. It is belt driven from an outside power source to give bearing surfaces some initial polish, and to check the operation of oil and fuel pumps, magnetos and valve gear. Next the engine goes to the test stand for an eight hour run-in under its own power.

Following the first period on the test stand each engine is completely torn down. All parts are washed and minutely inspected. After rebuilding, the engine returns to the test stand for a two hour second run-in and is then given its final test at full throttle. Into the permanent record of that engine are written readings of fuel and oil consumption, fuel pressure, oil pressure and temperature. Only after passing this final test and the critical inspection which follows is the engine adjudged worthy of the Pratt & Whitney seal.

No wonder "Wasp" and "Hornet" engines are favorites with pilots who rate dependability first. No wonder that on approximately ninety per cent of the major air transport lines of this country these engines are turning in consistently excellent logs — day and night.

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EAST HARTFORD · · · CONNECTICUT
Division of United Aircraft & Transport Corporation

Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec; in Continental Europe by Bavarian Motor Works, Munich; in Japan by Nakajima Aircraft Works, Tokyo.

Wasp & Hornet *Engines*

AERO DIGEST, December, 1930. Volume 17. Number 7.
Published monthly by Aeronautical Digest Publishing Corp., at 220 W. 42nd St., New York, N. Y. Yearly Subscription $3. Entered as second class matter July 17, 1922, at the Post Office, New York, N. Y., under the Act of March 3, 1879.

Hub-deep mud is no recommendation for AVIATION . . .

Installing 30-inch Armco Perforated Iron Pipe at the Buffalo airport—preparing splendid runways (for all seasons) for such giants of the air as that pictured opposite.

Build Public Confidence with

ARMCO Perforated Iron PIPE

UP AND DOWN the land airports are impressing a willing public with the safety of flying . . . by maintaining fields whose runways are always dry, free from mudholes and wet spots—ready for easy takeoffs and graceful landings in all seasons. They are building public confidence on a foundation of Armco Perforated Iron Pipe, endurance champion among corrugated metal drainage products.

It is the most practical and helpful psychology that could possibly be used in this critical period of aviation's development. Just beneath the surface, unharmed by rollers, trucks or landing planes, strong, durable Armco Perforated Pipe, of purest iron, carries off rain as it falls. Completely eliminates the physical and mental hazards of soggy, treacherous ground. Makes pilots confident, better fliers.

The importance of good drainage has been discovered by such airports as Buffalo, Rochester, New Orleans and others, where drainage systems of Armco Perforated Iron Pipe keep the runways right. Whatever part you play in aviation—pilot, airport manager or attache, member of an operating company, airport architect or engineer, plane manufacturer—whatever you do, aid your industry by supporting the cause of adequate drainage. Data on the subject, gathered in the field by Armco engineers, will be sent on request. Fill in and mail the coupon.

Armco culvert and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand

ARMCO CULVERT MANUFACTURERS ASSOCIATION, *Middletown, Ohio*

ARMCO CULVERT MANUFACTURERS ASSOCIATION, *Middletown, Ohio*
Send data, including the informative booklet, "Building Safety into Airports with Efficient Drainage Construction."

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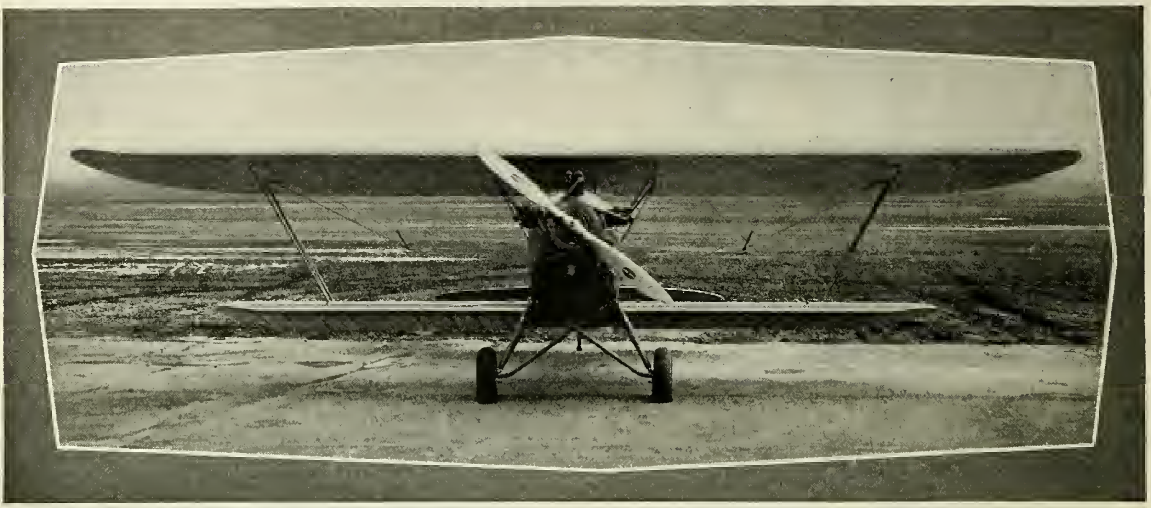
Title __________ *With* __________ *Airport or Co.*

AD12

FIRST!

Armco engineers, nationwide organization of drainage specialists, pioneered in promoting aviation safety through adequate drainage of the flying field. Airport architects and engineers regularly take advantage of Armco experience. They draw on the vast accumulation of data assembled at Drainage Headquarters, Middletown. *Use these facilities freely.*

● Except for more power, this is the same ship as that entered in the Guggenheim Safety Competition, in which it was designated as one of the few planes without any "trick" features whose performance and flying characteristics were excellent.



Announcing America's FIRST *all-round*

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A new Four-Place open cockpit BIRD of all-around utility . . . powered with a 125 h. p. Kinner Engine. Hop in it four together, three together, or fold up the front seat and in ten seconds fit the plane for dual instruction. Nowhere will you find a plane of equal carrying capacity and earning power with such low initial cost and upkeep. You know of its excellent visibility, its renowned safety and stability features . . . have them demonstrated to you at the most convenient airport. You can buy this new BIRD . . . America's first all-round airplane . . . at the amazingly low price of $4395.00.

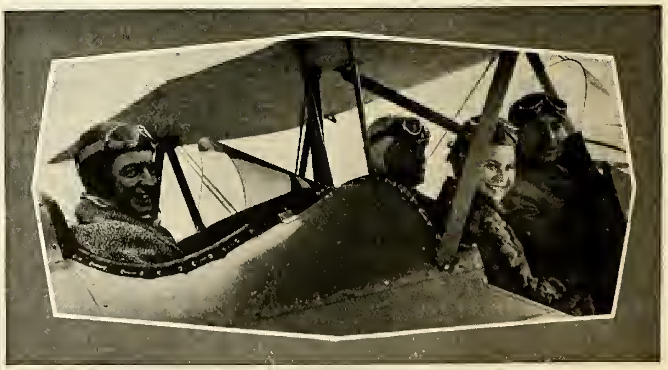
● *A limited number of Three-Place, open cockpit OX-5* BIRDS, *are available at $2195* ●

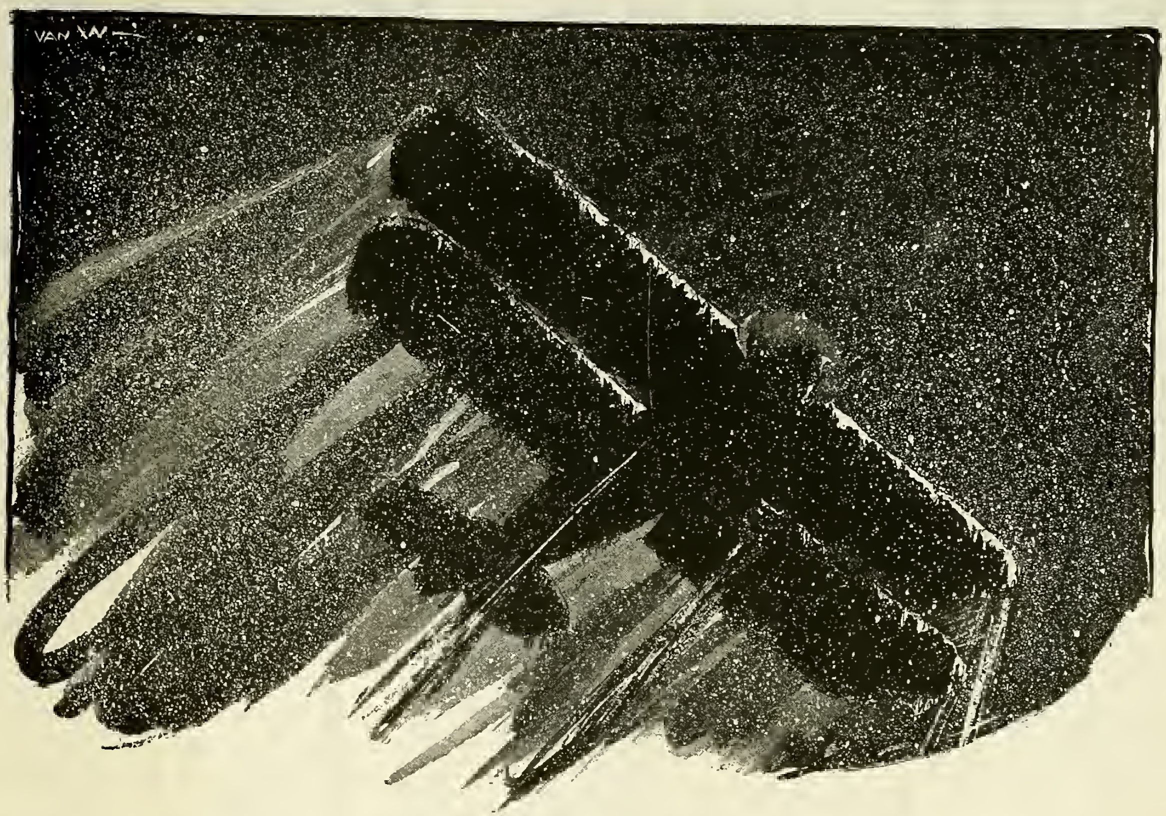
BIRD AIRCRAFT CORPORATION

As a Four-Place, *the new* BIRD *carries an additional passenger in front of the other two passengers. The extra passenger sits on a seat which may be folded forward out of the way instantly transforming it into a Three-Place.*

. . . .

Also; 90 h. p. Kinner-BIRD, 3-place, open cockpit, equipped as above, less aerol struts $3,895





SHEATHED IN ICE

WHEN the struts are caked with ice and the air is thick with snow, it's no time for engine trouble. Then especially it is reassuring to know that -TP- is in the engine, perfectly lubricating every working part.

-TP- Aero Motor Lubricating Oils are new—the latest development in scientific lubrication. They have been tested and approved by leading manufacturers of airplane engines and by many leading pilots. They are straight-run oils, not blended or compounded, produced from pure, paraffine-base crude by a process for which patents are pending.

This process has marked advantages over other methods. It removes all the paraffine wax, while preserving all the lubricating bodies in the crude. Elimination of the wax is responsible for its low cold test.

In terms of performance this means uniform viscosity at all working temperatures, minimum carbon deposit and ignition trouble from fouled spark plugs, easy cold priming, immediate oil pressure, perfect lubrication winter and summer, on the ground or at high altitudes—a maximum of safe flying hours.

A handsome, practical *Pilot's Log Book* sent free on request.

-TP- Aero
Valve Spring
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Also
-TP- Aero
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-TP- AERO MOTOR LUBRICATING OIL

REG. U. S. PAT. OFF.

2780

PLANES FAR UNDER COST

Curtiss-Wright has a surplus of demonstration and operation planes for immediate sale—at bargain prices. Many of them are practically new.

Dealers will find this sale a rare opportunity. Pilots who do not own a plane can pick out exceptional values. Every ship is certified by Curtiss-Wright as being air-worthy and in good flying condition.

The sale offers the greatest opportunity of 1930 to students, pilots, flying clubs, schools, operators and dealers.

This is the first and only advertisement of the sale. Write or wire immediately to the New York Office for complete price list, or to any Curtiss-Wright Flying Service base in the following cities, conveniently located from coast to coast:

PLANES OF THE FOLLOWING TYPES ARE OFFERED

TRAVEL AIR—Challenger	COMMAND-AIRE—OX-5
TRAVEL AIR—165 Wright	COMMAND-AIRE—Warner
TRAVEL AIR—300 Wright	FLEDGLING—Challenger
ROBIN—OX-5	FLEDGLING—165 Wright
ROBIN—Challenger	FAIRCHILD—225 Wright
ROBIN—165 Wright	FAIRCHILD—300 Wright
GIPSY—MOTH	LOENING COMMUTER—300 Wright
CESSNA—Warner	LOENING AIR YACHT—Cyclone
CESSNA—225 Wright	IRELAND—225 Wright
CESSNA—300 Wright	IRELAND—300 Wright
THRUSH—225 Wright	IRELAND—Wasp
FORD—225 Wright	SIKORSKY—Wasp

And other miscellaneous types, both open and closed

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MODERN AIRCRAFT

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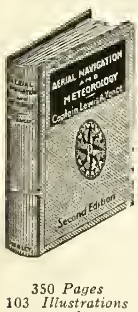
"ONE THOUSAND DOLLARS worth of aeronautical information for the small sum of five dollars," says Thomas L. Hill, Pres. Am. Society for Promotion of Aviation, Inc., of this comprehensive treatise that covers all phases of aeronautics. Written by an internationally known automotive engineering authority, it answers every question about the design, construction, operation and maintenance of all types of American and foreign airships, airplanes and engines. Used as a reference and text book in more than two hundred aviation schools. Invaluable to pilots, mechanics, officials. Some of the subjects: History of aviation and pioneer types of airplanes—various types of aircraft—free, captive and dirigible balloons—airplane parts and their functions—air and water cooled engines—airplane and engine instruments—dictionary of aviation terms. 855 pages of solid information with 400 illustrations and 23 tables. **Price—$5.00.**

AERIAL NAVIGATION AND METEOROLOGY



350 *Pages*
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By Capt. Lewis A. Yancey
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Naviagator of the Pathfinder on Its Historic Flight to Rome

THIS second revised and enlarged edition of Yancey's monumental work will be welcomed by aircraft pilots, students and everyone interested in the important subject of navigation. Written in simple non-technical language; indispensable to the transport pilot and those preparing for transport pilot examinations. The author, Capt. Lewis A. Yancey, famous trans-atlantic flyer, is a practical navigator with more than 15 years' experience, advisor to important long distance flights, lecturer, teacher.
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256 *Pages*
140 *Illustrations*

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A PRACTICAL, non-technical book for the aviation enthusiast that teaches aviation from the beginning and gives complete information necessary for U. S. Government license. Meaty, concise, up-to-date, this popular book contains 600 Questions and Answers explaining the construction of airplanes and dirigibles and how they navigate the air. Among the contents are a brief history of aeronautics, description of various forms of aircraft, elementary aero-dynamics, airplane parts and their function, airplane fuselage forms and landing gears, airplane wing forms and construction, engine types, propellers, airplane equilibrium and control, official records. **Price—$2.00.**

Tambien Tenemos "Everybody's Aviation Guide" Traducido al Aspanol Bajo El Nombre de "La Aviacion Al Alcance de todos." Precio $3.00.

HAWKS

AND HIS FAST TRAVEL AIR

LIVE UP TO THEIR NAMES!

"Distance is great. Time is valuable. Speed flying is the practical answer to the demand for transportation that does the errands of big business in split-second time and on time."

Thus the logic of Frank Hawks and of many an Aviation leader. But none has fitted fancy to the fact with such success as the famous pilot of the Wright-powered Travel Air "Texaco 13"!

In this ship Hawks showed 11,000,000 people of the Pacific Coast that a bare half-day separates them from the Atlantic's populations. He brought Boston within 53 minutes of Manhattan. The overnight train trip from Detroit to New York he cut to a brief 2¾ hours. In 20 minutes he flew from Philadelphia to New York at 270 m. p. h.! His Havana-New York time was less than 8¾ hours.

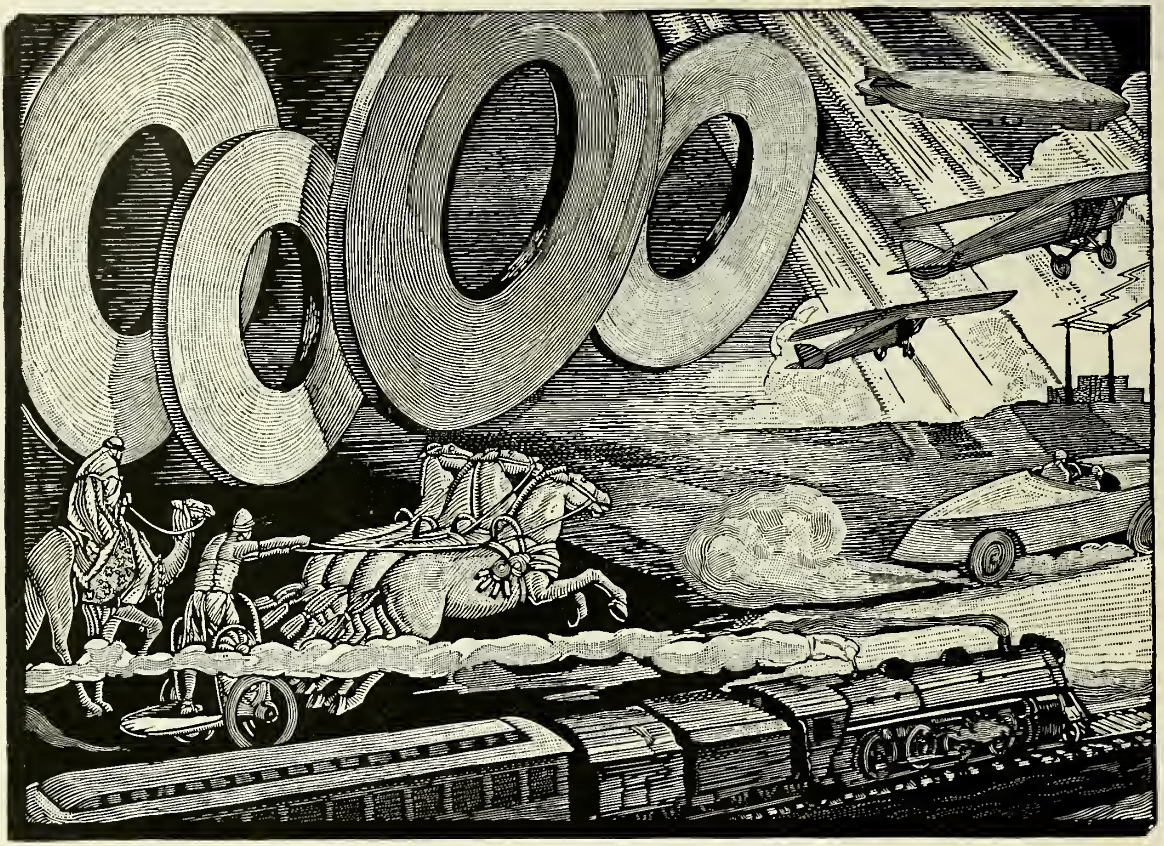
The "Texaco 13" is a Travel Air "Mystery Ship," a Curtiss-Wright plane built for sure, smooth speed. Its engine is a "Whirlwind 300." Pilot, plane, and power plant all give glorious proof that Curtiss-Wright equipment can cut costs by making each minute mean 4 miles!

CURTISS-WRIGHT

AIRPLANE COMPANY

TRAVEL AIRS ROBINS MOTHS

ST. LOUIS, MISSOURI



RELIABILITY

IN THE 1930 NATIONAL AIR TOUR 17 OF 18 COMPETING PLANES USED

KENDALL

Ready for the take-off at Detroit

The Edsel B. Ford Trophy

IN September at Detroit, 18 sturdy planes guided by pilots of the highest experience and skill winged away on what has been called the world's greatest "flying laboratory"—the 1930 National Air Tour. Ships of many makes and types were represented, from small, open planes, capable of carrying less than 600 lbs. useful load, to tri-motored giants with a useful load capacity above 7000 lbs. Power plants ranged from 90 h.p. to well over 1000 h.p. For all but one of these planes, Kendall Oil was chosen for lubrication throughout the tour. *Here indeed was a flying laboratory in which Kendall was severely tested and again proved Aviation's greatest oil!*

During a period of 16 days, these swift ships winged nearly 5000 miles on their scheduled race through 14 states and 3 Canadian provinces. Across chill mountain pass and wind-swept prairie, through fair weather and foul, they arrowed at top speed—for speed had been made a primary factor in the scoring formula of the 1930 Tour. Kendall protected, these motors took the last limit of the throttle, set new records of endurance and returned without a single exception to their starting point at Detroit.

Enduring reliability is refined into every drop of Kendall Oil. It has its source solely in the famous Bradford Grade of Pennsylvania crude. Kendall refining processes assure uniform purity. Kendall Oil will give a full thirty hours of flying service. Merely maintain the oil level. For full information regarding the extraordinary lubricating qualities of Kendall and a list of airports where it is sold, address, Kendall Refining Company, Bradford, Pennsylvania.

BUY AT THIS SIGN — PENZBEST KENDALL MOTOR OILS — IT IS YOUR PROTECTION

KENDALL OIL

REFINED FROM 100% BRADFORD GRADE OF PENNSYLVANIA CRUDE

Use the Air Mail!

SAFETY

PERFORMANCE

• LUXURY

IN this new all-metal Burnelli Transport, which has been successfully test flown for hundreds of hours and thousands of miles, are embodied qualities of safety, performance and luxury which have never before been obtained in any one airplane. The comfort of a commodious and richly appointed cabin has been made secure by performance to be marvelled at and a safety of design that will outlive the durable materials used in this new-day plane's construction. A Consulting Engineer's services are available to interested parties.

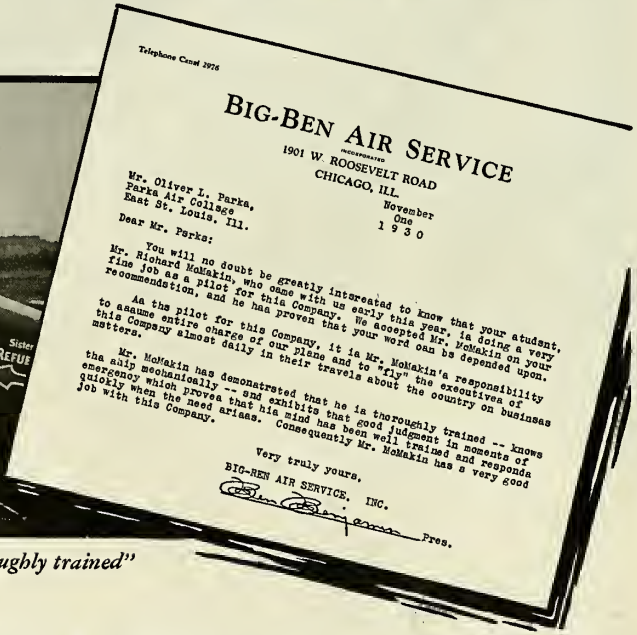
UPPERCU-
BURNELLI
CORPORATION
KEYPORT, N. J.

ANOTHER PARKS TRAINED STUDENT MAKES GOOD

The Story of Richard McMakin

Pilot for Big Ben Beverage Corporation

"*Mr. McMakin has demonstrated that he is thoroughly trained*"



Telephone Canal 2976

BIG-BEN AIR SERVICE
INCORPORATED
1901 W. ROOSEVELT ROAD
CHICAGO, ILL.

Mr. Oliver L. Parks,
Parks Air College
East St. Louis, Ill.

November
One
1 9 3 0

Dear Mr. Parks:

You will no doubt be greatly interested to know that your student, Mr. Richard McMakin, who came with us early this year, is doing a very fine job as a pilot for this Company. We accepted Mr. McMakin on your recommendation, and he has proven that your word can be depended upon.

As the pilot for this Company, it is Mr. McMakin's responsibility to assume entire charge of our plane and to "fly" the executives of this Company almost daily in their travels about the country on business matters.

Mr. McMakin has demonstrated that he is thoroughly trained -- knows the ship mechanically -- and exhibits that good judgment in moments of emergency which proves that his mind has been well trained and responds quickly when the need arises. Consequently Mr. McMakin has a very good job with this Company.

Very truly yours,
BIG-BEN AIR SERVICE. INC.
Pres.

Limited Commercial Training At Parks Classes McMakin As a "Top-Grade" Pilot

WE DON'T need to say much, in this advertisement. *The facts speak for themselves!* Here's another Parks graduate (February, 1930) that is a "top-grade" pilot. And don't forget! He took *only a Limited Commercial Course*—yet read again what his employer says of his training and ability. Isn't *this* the kind of training *you* want? Then, clip the coupon NOW, and get full information.

Parks Air College was one of the first to be licensed by the U. S. Department of Commerce as a fully accredited transport school

PARKS AIR COLLEGE

World's Largest and Finest Civilian Flying School

DIVISION OF DETROIT AIRCRAFT CORPORATION

Section 1260 Parks Airport

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MAIL THE COUPON TODAY!

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Without cost or obligation to me, please mail your illustrated catalog.

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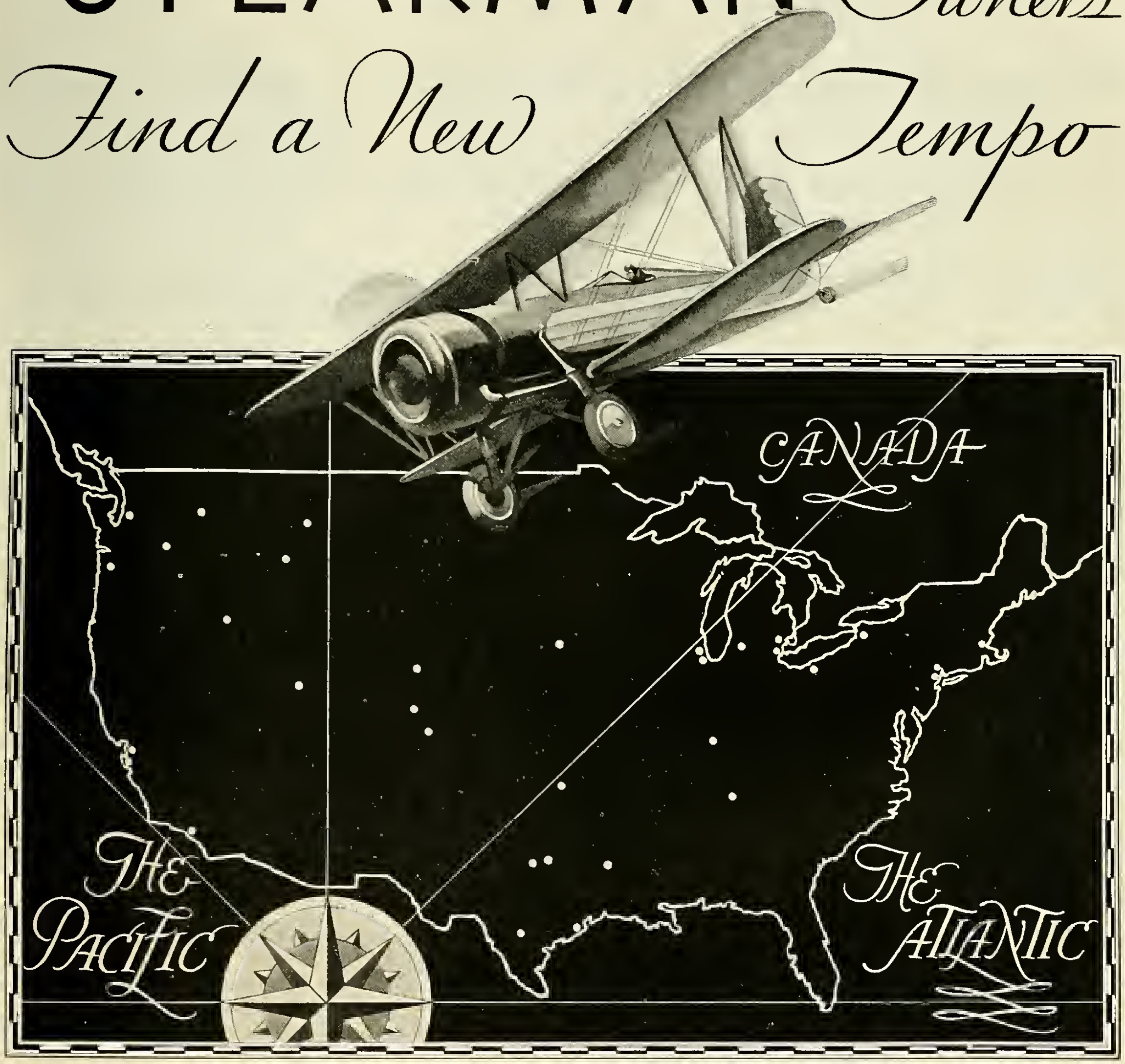
Occupation.......... Age..........

I am interested in Private Pilot's Course ☐
Limited Commercial Course ☐
Transport Course ☐

STEARMAN Owners Find a New Tempo



These dots represent the nation-wide service for Stearman owners

IT'S 110 m. p. h. time in America. Minutes mean more. Stearman owners go places as far apart as the oceans, constantly and delightfully aware that, wherever they go, they and their ship will be at home. They expect, and find, facilities that reach out. Stearman service is everywhere . . . service that serves and saves time . . . service built to maintain the Stearmans that carry the mail. And, of course, backed by the great, nation-wide United group. For every flying reason, therefore—Stearman. Junior Speedmail: 300 and 400 H. P. Business Speedster: 240 H. P. Write, wire or 'phone.

STEARMAN AIRCRAFT COMPANY
WICHITA . . . . . . KANSAS

DIVISION OF UNITED AIRCRAFT
AND TRANSPORT CORPORATION

TRAIN IN SOUTH TEXAS

BE "JOHNNY ON THE SPOT" FOR THE BIG PAY IN THE SPRING

Enroll today. Begin your training the day you arrive. Come to this School which offers you the most positive advantages. Your time and money are valuable. We save you both.

We offer you an experienced school with unsurpassed record. Complete ground training. Field, with hard surfaced runways and lighted for night flying. Close proximity to big Government Fields. Plenty of the best of modern equipment of varied types. Winter flying and lowest prices. Veteran pilots give you their personal attention and individual training. Our students pass their tests and secure best positions.

It's Winter in the North

but mighty pleasant flying weather in South Texas. Register now, in a school that can give you continuous training, uninterrupted by weather delays. Uncle Sam is spending his millions in San Antonio, the World's Greatest Aeronautical Center, because the weather conditions here are nearest ideal.

Name ....

Street ....

City ....

State ....

I am interested in your

- ☐ Mechanical Course
- ☐ Private Pilot "
- ☐ Commercial "
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R.R. fare to San Antonio from all U. S. points refunded on Commercial and Transport Courses and ½ on Private Pilot Course.

Best Training

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Shortest Time

OUR PRICES

Primary Course 10 hrs. flying	$ 150
Private Pilot Course 25 hrs. flying	375
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Transport Course 200 hrs. flying	2500
Mechanic's Course	100
Master Mech. Course	200

The Oldest and Best School in the South

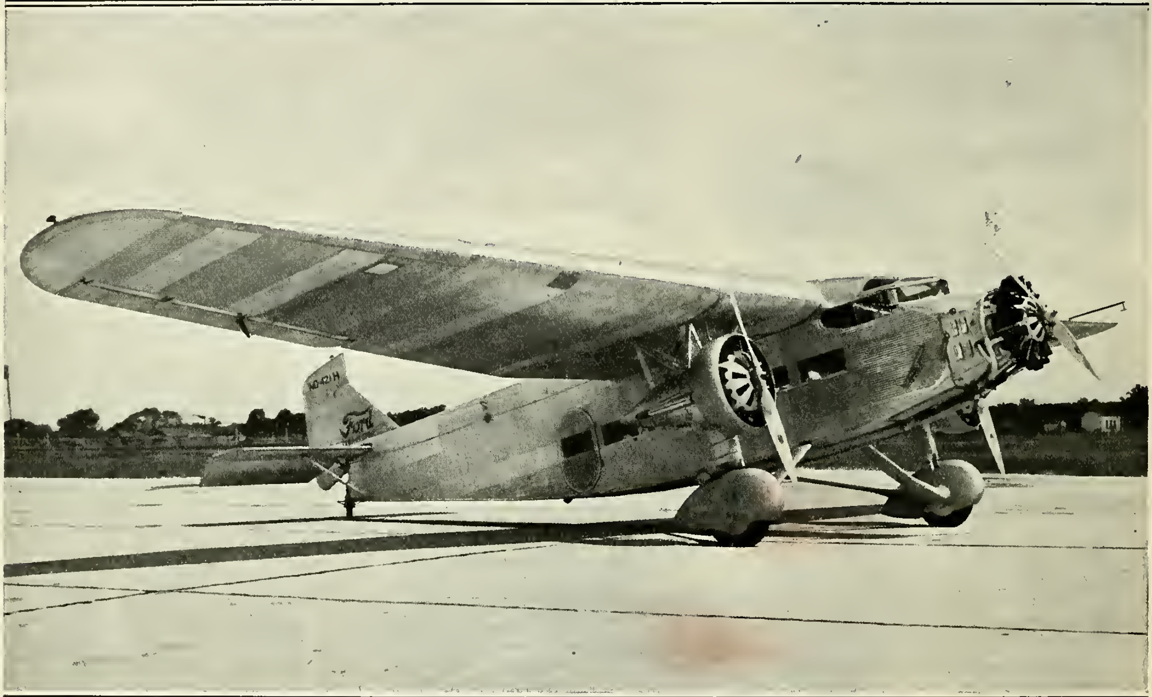
SOUTHERN AIRWAYS SCHOOLS

Aztec Bldg. **San Antonio, Texas**

12 YEARS UNBROKEN RECORD FOR SAFETY

RECORD SPEED...

IN PERFECT COMFORT!



Beauty . . . luxury . . . safety . . . speed!

MANY of those who realize that safety, comfort and dependability are outstanding characteristics of the all-metal, tri-motored Ford transport plane, may be surprised to learn that this plane is also the *fastest multi-motored plane in the world, according to the record established on September 29 at Detroit, over a closed course.*

164.4319 miles per hour is the official figure for the Ford tri-motored plane over this closed course of 100 kilometers.

144.24 miles per hour is the speed at which the Ford tri-motored plane won the race for multi-motored planes at this year's National Air Races in Chicago.

170 miles an hour, and more, was attained by the Ford tri-motored plane in winning the 1930 Edsel Ford free-for-all reliability tour.

These are but a few of the records established by the transport plane that has become so familiar a sight everywhere flying on regular schedules over the airways of the country.

The amazing speed of the Ford planes has been made possible not by increasing its power, but by simple refinements of design.

The de luxe club plane, a winged yacht, beautiful as a jewel, comfortable as your club, can be equipped for this high-speed flying without sacrificing any of the luxurious accommodations which distinguish it.

New de luxe club plane

Mechanical features are similar to those of the famous Ford 5-AT: Built of aluminum alloys, lighter than wood; powered with three Pratt & Whitney air-cooled motors, with total of 1275 horse-power; a capacity of nine passengera plus a pilot and mechanic. Cruising speed over 122 miles an hour, for hundreds of miles!

In addition, the de luxe club plane contains kitchenette, folding berths, radio cabinet, writing desk and bookcase. Seven overstuffed chairs and a two-place divan. Card tables and serving trays. Refrigerators and thermos cases. A lavatory with toilet, running water, towel racks, and closets for luggage, guns, fishing tackle or golf sticks.

Walls and ceiling are sound-proofed.

The entire interior is beautifully trimmed and decorated, in choice fabrics. Individual ventilation at each window. Dome and wall light and heat register in floor add to the comfort and luxuriousness of the plane. Tile walls in kitchenette and lavatory.

The pilot and mechanic in their forward control cabin have every mechanical device necessary for day or night flying in all seasons under all conditions.

Price on request.

FORD MOTOR COMPANY

Visitors are always welcome at the Ford Airport at Detroit

AERO DIGEST

Published Monthly. Single Copy 35 Cents. Yearly Subscription $3. Canada $4, Foreign $5.

Correspondence relating to editorial material, advertising, subscriptions, etc., should be addressed to the Aeronautical Digest Publishing Corporation, 220 West 42nd Street, New York City. Telephone Wisconsin 3771. Cable address AERODIG.

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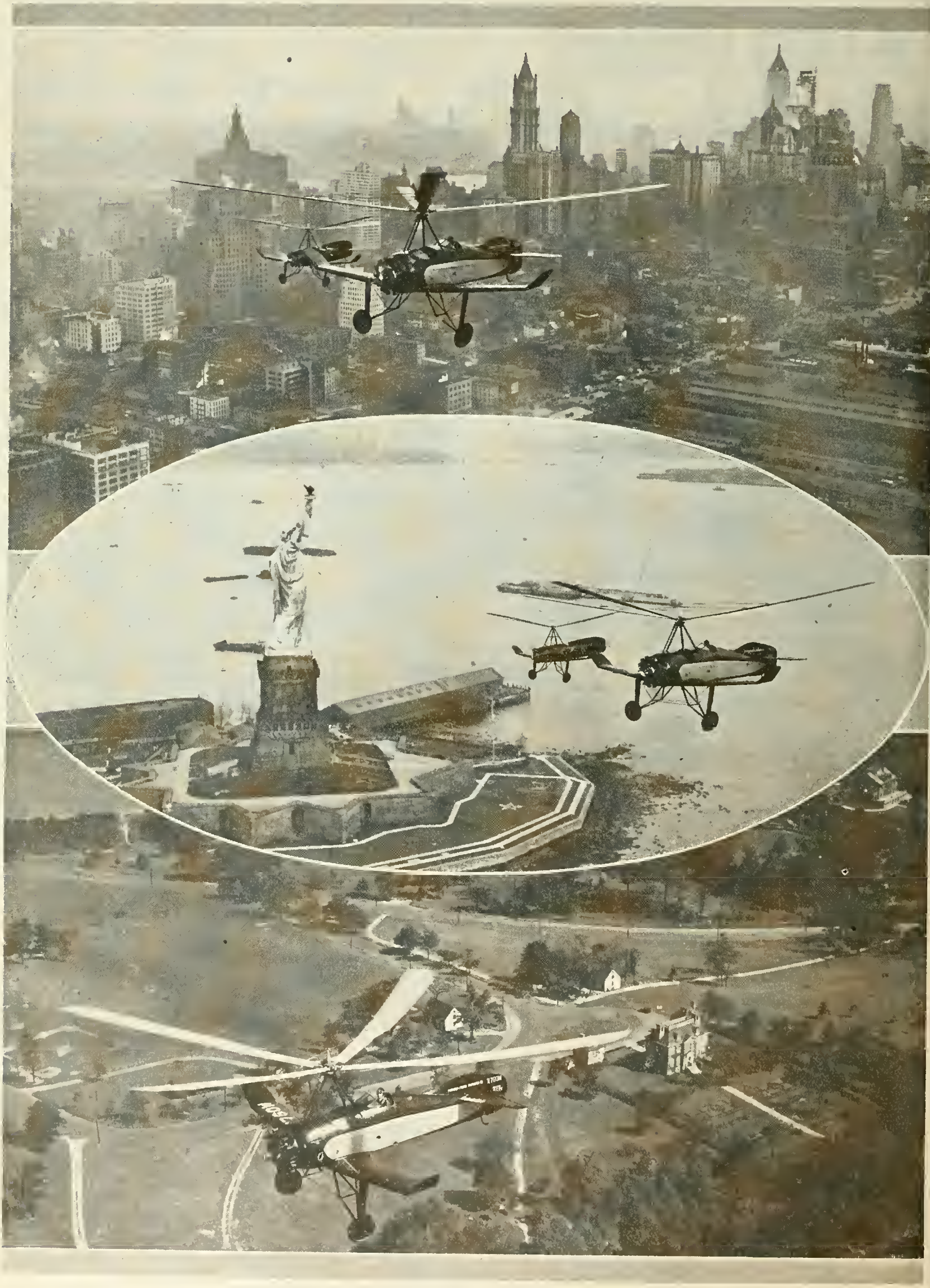
Vol. 17 — DECEMBER — No. 6

Cover Design: The Autogiro in Flight Over Philadelphia, Pennsylvania
Photo by Aero Service Corp.



Photos copyright by Aero Service Corp.

Autogiros in action, forecasting future possibilities; even now they are capable of take-off from suburban lawns, flight to business and landing on a platform two hundred by four hundred feet

USES AND POSSIBILITIES OF THE AUTOGIRO

By Juan de la Cierva

Inventor of the Autogiro

THE rapid growth of public interest in Autogiro development in this country carries with it the message to the American aircraft industry that the most important consideration from now on is going to be the increase of security in air travel.

Since the aerodynamic safety of the Autogiro was demonstrated satisfactorily a few years ago, the English and American companies sponsoring the machine have turned to the matter of performance. In aircraft performance, America has always been well to the fore. This is the case with the Autogiro.

Progress here is becoming cumulatively faster. As the machines get out into the hands of general users, great extension of their present more obvious possibilities may be looked for. Like the American faculty for rapid technical advancements, the American business acumen should develop uses for the Autogiro now undreamed of even by those most familiar with its characteristics. The Autogiro is appearing on the scene at the right moment; the public has been ready, but the needed type of machine has heretofore not been developed. Ninety per cent of your unbiased experts will admit that aviation has had but one chance, but that it found the matter of security the stumbling block with the people.

The Autogiro should have another immediate stimulating effect upon the aircraft industry in general. There seems little doubt that the cost of competent flight training has been a powerful factor in preventing many persons from purchasing machines. Even where the utility or pleasure possibilities of aircraft have been amply demonstrated to him, your potential businessman-pilot or sportsman-pilot has found strong objections in the thousands of dollars and months of training necessary before he can fly with reasonable safety.

In the case of the Autogiro, these objections are easily met. As soon as the novice pilot has mastered the elements of the control system, he can safely be permitted to fly solo. He may still err in such matters as navigation; he may even make the mistakes which so many have found tragically ridiculous, but mistakes are not necessarily serious in flying the Autogiro.

In this country, it has been repeatedly demonstrated that airplane pilots can easily fly Autogiros after no training whatever, and the Autogiro test pilots, men who were accomplished instructors before taking up Autogiro work, feel that students can be trained to fly the Autogiro in a much shorter time than to fly an airplane.

In England, we are now giving serious consideration to the question of doing an important part of our training for new pilots on the ground. Since so much less skill is required in maneuvering and coördination of controls, it is felt now that it is perfectly possible to cut down even the very small amount of dual training required on Autogiros by teaching the student part of the control while on the ground.

Autogiro development in several countries is beginning to assume a rather comprehensive aspect. Technical advancement in some cases is bringing the Autogiro quite far away from its present resemblance to the conventional airplane, and within a year or two, decidedly interesting developments ought to be forthcoming.

As an instance of this is the Autogiro's applicability to marine use. One rather elementary seaplane-Autogiro which I have flown over English waters has shown that such a machine, with its very short take-off run and absence of landing run, can very definitely simplify the entire matter of over-water flying, and probably eliminate to a large degree the hazards of rough water operation. Incidentally, I had never flown a seaplane of any type before I flew this ship, which was simply an obsolete type of Autogiro mounting ordinary twin floats.

The Autogiro principle, so far as can now be seen, suffers no limitations of size or performance. Some provisional designs for larger machines have been made, and one type, a five-place cabin job intended for operation in and out of restricted areas, such as might be met in the interior of large cities, has already reached the design stage.

It is my firm belief that Autogiros can be made to practically any size, although I think that the factor of interference will always prevent the use of one rotor above the other, and that the structural difficulties make side-by-side or tandem rotor design impractical.

I believe that forthcoming Autogiro use will present the following picture:

First, extensive building of small Autogiros for sport, utility and general transport. Then larger machines, probably of the cabin type, for what we now term aerial taxi service. Next, the obvious safety of the machine for night flying, and particularly blind flying, should lead to its use on night mail and express lines. Finally, when the Autogiro has conclusively demonstrated its safety and utility in the three foregoing fields, we shall see it enter that of passenger transport, probably in multi-motored types, to which it is perfectly well adapted.

The Autogiro, I feel, is making its commercial advent at a particularly fortunate time. This country and others are in every way ready to utilize its commercial potentialities. Within the range of Autogiro construction—fast ones, slow ones, large machines, small machines—there will be found types to fill most of the gaps which so may persons see in aircraft construction today.

TAKING UP THE SLACK

By Don Rose

Don Rose Suggests a Better Remedy Than Witchcraft for the Industrial Stomachache

THE witch-doctors, rain-makers, medicine men and nature-fakers are having an unusually busy season. Not in the memory of man have they had such opportunities for their talents nor such a patient and enduring audience.

Possibly we brought this on ourselves. When business fell off its high horse last year, there was a rather remarkable scramble to pick up the pieces and put Humpty-Dumpty together again. And when the poor thing refused to be repaired at once, the public began to call frantically and fearfully for doctors, surgeons, plumbers, carpenters and cobblers to do something and do it quick. So that soon every third citizen was on his way to a conference on unemployment and every half-baked notion on how to convert a depression into a hump was sure of a hearing.

The remedies proposed to date have run all the way from eating an apple a day to keep hard times away, to a plan for buying freely and allowing the department stores to do the worrying about the bills. It has also been suggested that we build a million miles of roads and bridges, though it isn't indicated where the taxes will come from to pay for them. It has, furthermore, been proposed that everyone should economize until it hurts and also that everyone should spend and buy until it hurts. Aside from these, there have been plenty of suggestions that the President, Congress, the Wickersham Commission, the bankers, the brokers, the Rockefeller Foundation and the New York Stock Exchange should do something to support our national prosperity in the style to which we are accustomed. Most of them have originated with individuals who wouldn't know what to do if they were supplied with the authority of President Hoover, the wealth of Mr. Henry Ford, the personal prestige of Colonel Lindbergh and three or four regiments of Marines in order to devise and carry into effect a cure for the national stomachache.

There has been nearly as much disagreement concerning the cause of whatever is the matter with us. Overproduction and under-distribution have both been mentioned. The Republicans have been blamed for it, and it has been darkly hinted that the Democrats have been doing dirty work at the crossroads. The trouble has been tacked on to the Tariff Bill and also referred to unfair competition from nations which don't enjoy the inestimable benefits of a tariff. The industrialists swear the farmers did it, and the farmers are sure that big business is responsible. And when every other explanation fails, it is fashionable to say that this is a purely psychlogical phenomenon and that the country is fundamentally sound—an admirable sort of optimism, except that a jobless man can't eat it.

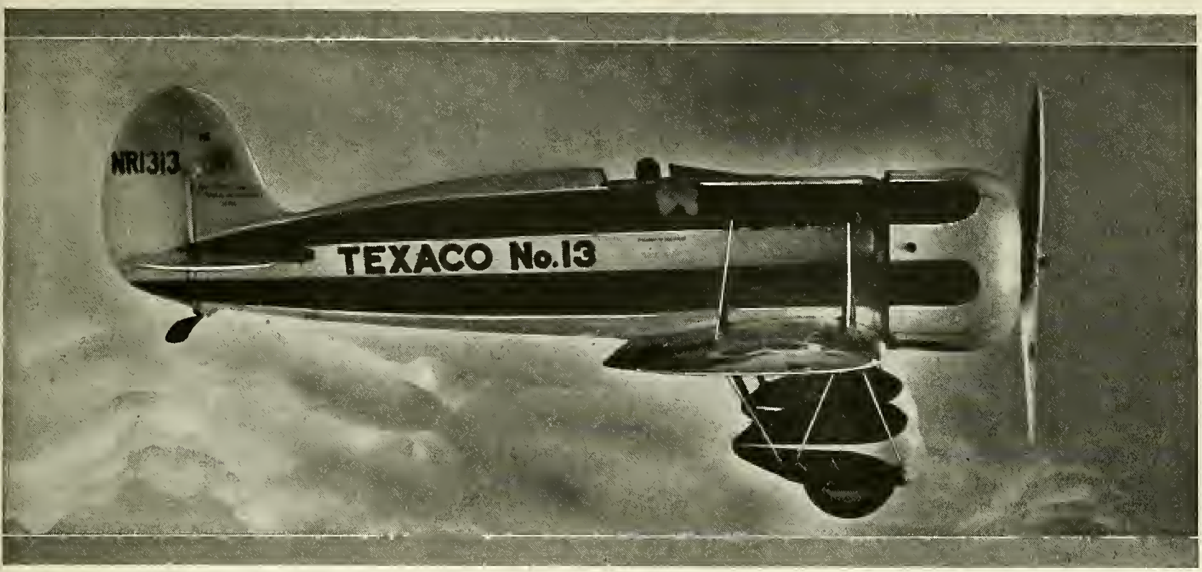
Now, as a matter of fact, the present uncertainty, timidity and real troubles of business could be blamed on a score of factors, and in doing so the analyst would be entirely right and altogether wrong. No single stone makes an avalanche, but any single stone may start one. It would be perfectly proper to say, for instance, that business is bad because of a gold shortage, which leaves the world with too little loose change in its pants pockets. It could be proved that a surplus of silver in China and India has done the damage, by spoiling the appetite of the world's biggest market. It might be shown that Europe's nervous indigestion, brought on by the war and aggravated by the headache which is Russia and the liver complaint which is Italy, is directly responsible for bread lines in America. And since these are all true, none of them is the whole truth. Probably there is no single formula which can be made to cover the condition.

But there is one which has been generally overlooked or ignored, probably because it isn't very pleasant to contemplate. It is so close to us all that we don't see it, which is one reason why we expect to find the answer in Washington or Wall Street or anywhere else that is so far away that it can't answer back. But as a matter of common sense, a universal condition must have a nearly universal cause, and the blight on business is no local nor even national matter. It is felt today in Pekin and Peoria, in Hoboken and Hamburg, in London and Los Angeles, and in Leningrad and Little Rock. The mutton farmer in South Australia knows about it, as well as the textile worker in Massachusetts or the shipping clerk in a South American warehouse.

The most sensible and illuminating supposition under the circumstances is that the world is in the throes of a second industrial revolution and is gasping for breath. You will recall that it went through one before. Something more than a century ago a young chap watched a kettle boil and wondered what should be done about it. Very shortly afterwards civilization began to scramble around like an ant-hill just after a dog has buried a bone in it. The workers rushed toward the cities, the factories lifted their ugly snouts to the sky, the cities spread and multiplied wherever there was coal and running water and a highway to the sea. Probably the people of those times didn't know that a revolution was going on, but nowadays we date the modern world from the discovery of the power of steam.

It doesn't do to forget the fact that those were dangerous days and uncommonly uncomfortable ones. Men and women went hungry and lived miserably, even while they were discovering and developing the secret of the amazing wealth of the twentieth century. They were creating the modern world, and meanwhile were being heartily kicked in the pants by circumstances which they couldn't control. They were ugly days, and we are well rid of them.

But there is a suspicion of the same ugliness in the hard times of today, though it is mercifully minimized to a fraction of its former fears and dangers. For at the very worst we are infinitely better off than our great-great-grandfathers, and our doldrums of depression would have seemed like sheer luxury to the people of the late eighteenth century. But because something is going on today which seems nearly too big to be (*Continued on page* 152)



SPEED

By Captain Frank M. Hawks

Supt., Aviation Div., The Texas Company

IN HIS article "What's Wrong with Aviation?" which appeared in *Liberty* for November 22, Bogart Rogers says:

"What American air transport travel needs is faster and more frequent service. It seems obvious that air transportation is going to progress not by carrying more people at one time than the old forms of transportation, but by carrying people faster and farther in a given time and offering them more frequent schedules."

Indications such as this that others are beginning to appreciate the matter of speed are indeed gratifying. Since I made my first cross-country flight in a high-speed airplane, I have been thoroughly convinced of its value to the progress of aviation. The arguments in favor of speed are many, but I know of only one consideration that can be used in rebuttal—the frequently reiterated remark, "High speed is all right, but think of the dangers of the increased landing speed."

Consequently, before continuing on my favorite topic, I should like to comment briefly on this matter of landing speed. The majority of those who are so critical of this factor have had little or no experience with the type of aircraft that is supposed to land so fast. They generally assume, largely because of time-worn aerodynamic theories, that the landing speed increases relatively with the airplane's top speed. Improvements in design have, however, somewhat changed the ratio, and I believe we are drawing nearer and nearer the desired end. We must all be open-minded on the subject at least.

At the present time I am flying a ship which is definitely in the category of high-speed airplanes, a ship which travels at full throttle in excess of 240 miles per hour. The general belief about this plane is that it must land between eighty or ninety miles per hour. I can prove that that notion is very erroneous. As a matter of fact, I do not find the landing speed of this plane in any way alarming.

The progress of high speed aircraft has been amazing. Twenty years ago the speed of the fastest airplane was about forty-five miles an hour; now, it is approximately 345 miles per hour. Just what the limits will be I do not believe we can accurately predict at the present time.

I feel quite certain that future developments along this line will necessarily have to be in closed type monoplanes of the flying wing variety, with retractable landing gear and powerplants placed in the wings, thus greatly reducing the head resistance. By minimizing this resistance, we can anticipate a high speed at sea level which will range from 200 to 250 miles an hour on serviceable commercial aircraft. Racing planes embodying these characteristics will probably increase these figures another 150 miles per hour in the dense atmosphere.

In rarefied atmosphere, at altitudes from 15,000 to 40,000 feet, there are still greater possibilities. From Germany there comes a report the Junkers company is building a plane capable of 500 miles per hour at 40,000 feet. This may or may not be true. Certainly, such a figure in miles per hour is possible only at these high altitudes. Unquestionably, too, the airplane must be a sealed cabin type with a highly efficient mechanism for supplying oxygen to the occupants.

No human beings can fly eight miles above sea level at the present time without cumbersome, though nevertheless efficient, mechanism for supplying air for proper respiration. Of course, it is readily understood and agreed that the motor must also be supplied with additional air for its operation. I believe, however, there are fewer obstacles to overcome in the motor problem than in taking care of the human beings. And, unquestionably, the latter come first in consideration.

The arguments which I present in favor of this speed factor have been arrived at through actual experience and demonstration. I have not many theories to expound. I have great hopes and always (*Continued on page* 138)

AVIATION AND THE TARIFF

By William W. Luftig

THE Hawley-Smoot Tariff is being severely criticized on the grounds that it will not only stop expansion, but will also cause curtailment of the export trade of the United States. It is argued that foreign countries cannot buy American goods if they are deprived of the means of payment afforded by the marketing of their own merchandise in the United States. The logical conclusion of this line of argument is that the prosperity of the United States will suffer not only from this country's inability to sell its present surplus output, but also from its inability to expand its producing capacity at a rate which would otherwise be possible.

Will the Hawley-Smoot Tariff Prove Detrimental to the Growth of Aeronautic Exports?

On the other hand, the proponents of the tariff contend that the injury which the new tariff law will do to the total volume of the import trade of the United States has been considerably exaggerated. They hold, furthermore, that the prospects are that the volume of imports will continue to show a substantial expansion. The business recession which the United States is now experiencing is only a temporary matter. The upward trend of expansion will continue. The United States will have to purchase from foreign countries larger quantities of those commodities which are not produced here. The three leading imports of the United States, silk, coffee and crude rubber, are still on the free list. Foreign countries are not yet in a position to ban our products despite reported threats. They must have such products as raw cotton, machinery, petroleum, automobiles; and this country is the chief source.

The aviation industry is vitally concerned with the effects of the tariff on its export trade, but it is necessary to go beyond the tariff to determine just how airplane exports will be effected in the future. There is no doubt that since the close of the war the world has been swept by a tide of protectionism. We cannot depend any longer on the unnatural post-war situation for foreign markets. This trend is indicative of an attitude to shape commercial policies of European countries in coming years and represents an added problem with which our credit and financial executives must contend. A careful analysis of tariff laws of European countries shows a tendency to rely more and more on European trade than on overseas trade. At the present time the individual European countries have high tariff barriers preventing the free movement of commodities from one country to another, but there is an undercurrent movement to abolish so far as possible these barriers and foster European trade, with a resulting tendency to restrict imports from the United States. The American tendency to extreme protectionism is in harmony with this general trend found among the other leading nations. The war intensified the feeling of nationalism. Practically all European countries revised their tariffs upward following the war, and even England in 1921, with all her free trade traditions, enacted a law to protect pivotal or key industries.

Import duties on aeronautical products vary for the different countries. Some governments have not as yet established rates for them. Others do not care to do so because the benefits accruing from airplane operation warrant the encouragement of airplane, engine and parts imports to the extent of allowing free duty. Furthermore, practically no country, with the exception of some British colonies which favor British goods, grant lower duty rates to European aeronautic manufacturers than to American.

Nevertheless, our leading markets tax our imports highly. Canada has a thirty-five per cent duty on American-made planes entering her territory for commercial work. This duty has necessitated the establishing of American manufacturing plants in Canada. Argentina has a duty of thirty-two per cent *ad valorem* on aircraft parts and engines. China has a tax of twenty-two and one-half per cent *ad valorem* on completed planes.

These rates, however, are no higher than our own. We have an import duty of thirty-five per cent on airplanes, parts and accessories. This duty was enforced prior to the new tariff law and has not been increased. If we put a duty on airplanes and associated products, foreign countries do likewise. If we attempt to bar the products of other countries, they bar ours. European countries do not figure at all as purchasers of complete aircraft from the United States, although engine and parts shipments to Europe remain important. Inasmuch as Europe needs our machinery, we need not fear high tariff walls on airplane engines and accessories for the immediate future at least. Our leading importers of airplanes and airplane parts tax them liberally. Of course, the duty is absorbed by the customer, and if there is a market for our aircraft, the tariff will have very little bearing upon the successful conclusion of the sale.

During the first six months of 1930—seventy-six per cent of our aircraft exports were to Latin-American countries and the Far East. The exports to European countries have been almost negligible. The United Kingdom has bought less than $13,000 of engines and parts. Germany has been our best customer for engines, having during that same period bought about $115,000 worth. This is about one-third of the value of exports which she bought during the first five months of 1929. France has bought only parts, this year amounting to less than $13,000 in value. Italy is a small importer of our aircraft products. The total exports of aircraft, engines and accessories, exclusive of tires, for the first six months of 1929 amounted to $5,130,881 as compared to $4,812,720 for the same period this year. The reduction is no doubt the result of the world-wide character of the present economic difficulties rather than to any retaliatory measures taken by other nations against our tariff. Italy, Spain, France, Switzerland and Canada have increased their tariff rates on scores of items against us. Other countries are planning to do likewise, but any increased tariff rates by European countries on airplanes do not mean much because our exports to Europe are not of great (*Continued on page* 146)

CYDE-LIGHTS ON THE NEWS

By Cy Caldwell

EVERYBODY reads the newspapers, but few pause to wonder how the news got into the paper. If he considers the matter at all, the average reader will visualize a vast army of news gatherers, dashing hither and thither across the face of the earth, digging up news items —some of them, working for the tabloids, evidently doing their digging in the town sewer.

Until a comparatively few years ago, this picture was correct; the newspapers had their own reporters who collected local news, while national and foreign news was procured by the several press associations and sold to the newspaper. The paper paid for everything that went into it—paid the reporter for the local news, and paid the association for national and foreign news, unless it had its own correspondent, in which event it paid the correspondent.

But a few years ago a group of kind-hearted men with bright imaginations became sorry for the poor old newspapers who had to pay for news. So they said to themselves, these kind fellows, "Why shouldn't we *give* news to the poor old hard-working newspapers? Why shouldn't we, on our own time, go out into the highways and the "buyways" and find news to present, gratis and for nothing, to the papers? Why not, indeed.

So out they went, these good Samaritans, and found news to give to the newspapers, which seemed very nice of them indeed. The editors were delighted. No longer need they wonder where their next news was coming from. They only had to cough, and one of these charitable news gatherers would come gallumphing into the sanctum, simply full of information about something or other—usually something that someone had for sale. Of course, the paper had its advertising columns where one could chat about his product to his heart's content; but somehow it seemed nicer to get the information into the news columns. Besides, you paid to get your ad in the paper, but they took your news for nothing and were glad to get it.

Thus was built up that great charitable organization of kindly news collectors, now known as Public Relations Counsels or, vulgarly, as publicity men. Their happy duty it is to get their employer's name, face or product into the papers without cost other than their own salary or fee. If they manage to do that, they live; if they fail, they die—at least as public relations counsels. At the present moment, for instance, Gimbel's sub-basement is crowded with former aviation publicity experts who are waiting for times to improve. Meanwhile they wrap bundles or call monotonously, "This car going up!"

I AM not going to descant on the trials and tribulations of a publicity man, but I must mention enough of them to explain some of the news you read in your paper—for why some of it is there as news is a secret to all but the initiated. Often it is not news, but advertising, pure and simple—usually simple.

The Public Relations Counsel sits in his office, thinking, and thinking, and thinking. Like many of the rest of us, he is trying to live by his wits; and the distressing thought steals over him that he is slowly but nevertheless surely going bankrupt for lack of capital. How can he get his employer's name into the paper today, he asks himself? Echo answers nothing. Neither does his head. He scratches it forlornly; nothing happens. He scratches it again; still nothing. He pulls out two or three hairs—nothing yet. He yanks out a handful—and all he has is a headache!

By this time the poor yokel is desperate. He gets out his old clippings—how pleased he was when first they appeared, and he laid them proudly on his boss' desk to prove how smart he was! Alack! There is no comfort in them now. He can't use any of them again—the editors would recognize them as old stuff, and refuse to run them. He must think of something new—something new—something—anything—boy, anything!

The man is now on the very edge of a mental collapse. He has, we will suppose, a wife and three little Public Relations Counsels at home. They eat, all of them; they also wear clothes. In short, they demand money; so does he. He's still getting it, but for how long, if he can't think of an idea to get that accursed name in the papers?

He rises from his chair, paces the room, moans, groans. Why in the world did he ever become a publicity man—with no publicity? Why didn't he lead an honest life and become a chiropractor or an astrologist? Even a numerologist?

By now he is crying softly to himself and throwing things off the desk. Another moment, and he will become a maniac. "An idea! An idea! My kingdom for an idea!" he groans. "My kingdom for a horse!"

Miraculously his prayer is answered. A pilot enters the room, throws himself into a chair, and sighs.

'Well," says the pilot, "what are you looking so worried about? Anything happened?"

"Nothing has happened," says the Public Relations Man,

(*Continued on page* 134)

International Newsreel Photo

For the sake of Naval publicity, "Orphelia" takes to the air.

AIR—HOT AND OTHERWISE

Why the N. A. C. A.?

By Frank A. Tichenor

HERE is a matter of such vital importance to the industry that we cannot write of it save with plain words of considerable solemnity. It is a matter to which we respectfully would call the attention of the President. Indeed, we do so explicitly and respectfully, refraining from anything except such a statement as will make facts clear.

In this period of industrial readjustment, particularly in the aviation industry, our thoughts turn to a very important basis of technical enterprise, experimental aeronautical research. A young industry is more dependent on research, and at the same time less able to provide for it, than older and better established industries. Because the Government has been well aware of this situation, nearly all aeronautic research in this country has been financed and carried on by the Federal Government. Foremost in this activity has been the National Advisory Committee for Aeronautics, for which Congress has provided funds. The N.A.C.A. has obtained from Congress funds for the largest, the most splendidly equipped and the most modern laboratories, and facilities for aeronautic research. To all practical purposes aeronautic research in America means N.A.C.A. research. Our thoughts turn in this hour to this research activity, and with full concern for conditions in the aeronautic industry, we ask ourselves whether the N.A.C.A. has discharged its duty well, whether it has given to the industry the full return to which it is entitled for these appropriations.

How greatly aeronautic progress depends upon research has indeed been fully realized by those in charge of N.A.C.A. work, as is indicated in the annual report of the N.A.C.A. for 1921 (page 5):

"Substantial progress in aeronautical development must be based upon the application to the problems of flight of scientific principles and the results of research."

Research activity of the N.A.C.A. has been going on for more than ten years. The first appropriation for a wind tunnel having been made in 1917, this tunnel was reported to have been completed in 1918. Experts tell us that a year is ample time to build an ordinary small wind tunnel. Nevertheless, although the wind tunnel was completed, it was not then put into operation. In 1919, the tunnel was again reported not yet in operation. Finally, in 1920, the same tunnel originally reported as finished in 1918, was once more reported as finished. The year 1920, therefore, we are entitled to consider as the beginning of research activity, particularly inasmuch as an engine laboratory and free flight test facilities had been announced as completed in 1919.

This fact is important because the results of research cannot be judged from the activity of one day, or one month or even one year. Aften ten years of uninterrupted activity, however, with continuous liberal financial support, the N.A.C.A. can be judged according to the results derived from its research work and an estimate can be made of what we have a right to expect in the future. Let us, therefore, review these results and ascertain what the N.A.C.A. has achieved.

The standard by which the results of research should be appraised is defined by the N.A.C.A. itself. Repeatedly, its annual reports have stressed *scientific* research as of paramount importance. For instance, almost all reports close like that of 1927 (page 76): "Further substantial progress is dependent largely upon the continuous prosecution of *scientific* research," and farther below on the same page, "its (N.A.C.A.'s) work in the fields of pure and applied research on the *fundamental* problems of flight." The latest report, that for 1929, states (page 87): "The most important active influence upon aeronautics has been the farsighted and constructive policy of the Federal Government, liberally supported by Congress and the President, in providing for the continuous prosecution of organized *scientific* research." In the 1926 report we find (page 69), "The more *fundamental* investigations are undertaken by the Committee in its own laboratory," and (page 68), "to conduct investigations of a truly *scientific* character." (The italics are mine.)

We could easily quote other passages from N.A.C.A. publications to the same effect. The N.A.C.A. is not an aircraft factory; it is not interested in the properties or the development of any particular airplane. More general scientific investigations are its domain. It is charged with the responsibility of furnishing information concerning aeronautics as a science.

Nor do the annual reports of the N.A.C.A. leave any doubt about what is meant by "scientific research." That of 1922 (page 48), defines the term clearly:

"By scientific research is meant the investigation by trained men in a properly equipped laboratory of the *fundamental phenomena of nature*. . . All progress depends upon the acquisition of knowledge, of new knowledge. This can be obtained only by long continued investigations *directed by men who know the problems and the methods used for their solutions*."

Perhaps the best standard by which to judge the results of ten years of N.A.C.A. research is in terms of returns for the funds spent. Even with a small appropriation there is no upper limit to what can be obtained in the way of research if that research is directed "by men who know. . ." There is, however, a lower limit to what ought to be obtained for a given amount of money. It stands to reason that we can expect more for an expenditure of $2,500 than for one of $250, and more for one of $25,000 than for one of $2,500.

The N.A.C.A. has spent on each of its research items undertaken more than $100,000, and we have a right to count on important results from $100,000 researches. This average expenditure for each problem investigated is computed by dividing the sum of the money spent by the number of problems undertaken. Thus far the N.A.C.A. has received $4,936,370 in appropriations. Approximately $4,800,000 has been spent (presuming the expenditure of the whole sum of $1,508,000 appropriated for 1930). The results of its research are laid down in eighty-eight Technical Reports. All other N.A.C.A. Technical Reports contain information obtained from outside sources, the N.A.C.A. acting only as publisher. This means that more than $50,000 has been spent for each report on a research project. It means much more per research, for at least four reports are always issued (*Conitnued on page* 124)

DR. RUMPLER'S TRANS-OCEAN AIRLINER

By

Edwin P. A. Heinze

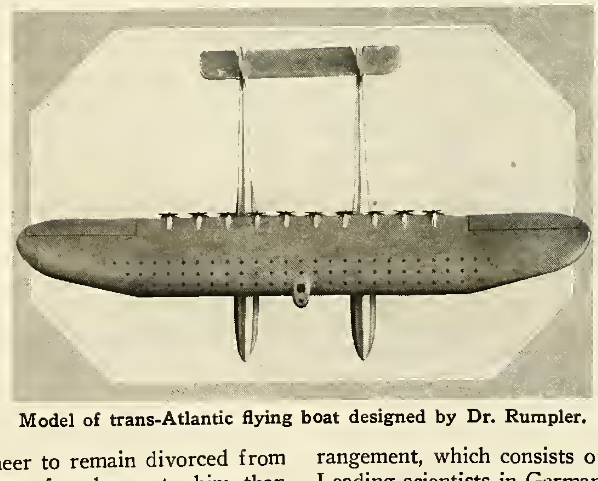
Dr. I. E. Rumpler, the noted German aeronautical engineer, is now in the United States to negotiate with a financial group in the founding of a company for the construction and operation of giant flying boats which he has designed. According to present plans, the boats are to fly between Europe and America in regular operations.

FEW pioneers of aviation can look back upon such a success as that of the Austrian engineer Dr. Ing. Edmund Rumpler. This distinguished designer of aircraft was born on January 4, 1872, at Vienna. He has always displayed a singularly alert mind, and in the course of his life, has made many notable inventions. By 1880, Rumpler, while still in his boyhood, had become interested in aviation and, although after leaving college and completing his technical studies he took positions in various engineering works, he always was particularly attracted to aviation and never for a moment lost interest in its development. In 1898 he went to Berlin. Later, in 1906, after having worked for a short time in Holland, he established his own engineering office in Berlin. It was then that he definitely decided to devote his attention to aviation, and in 1908 he started building airplanes. In that year he went to Le Mans and there saw the Wright brothers demonstrating their machine. Those early flights at Le Mans left a lasting impression on him and stimulated him in his own work.

Rumpler's progress in aeronautics was fast. With the development of his famous "Taube," his renown spread throughout Germany, where for years afterwards the term Taube was used synonymously with airplane. During the war numerous successful models were developed, as a result of which the Rumpler works grew to be what was at that time probably the largest airplane factory in the world.

After the war Dr. Rumpler gave up building airplanes for a time, again devoting himself, as he had done in the early years, to automotive engineering. It was during this period that he brought out the well-known "drop-car," a streamlined motor car with the engine at the rear and with an articulated rear axle. Although the car was manifestly very progressive, buyers would not take kindly to it because of its unusual form. Consequently, this enterprise was destined to failure.

But even at that time Rumpler had another idea in aircraft design. He was too innately the aircraft engineer to remain divorced from the field of enterprise that was far dearer to him than all else. And now after ten years of secret, assiduous research and study, he has developed an entirely new type of long-distance airplane. Clearly foreseeing the needs of the future, he undertook to design a huge airliner that could operate dependably between Europe and America. His conception of this great plane, since he made it public in 1926, has won him many disciples.



Model of trans-Atlantic flying boat designed by Dr. Rumpler.

Dr. Rumpler based his idea on the fact that there is a limit to increasing the span and size of airplanes designed according to conventional practice. In airplanes beyond a certain size, the weight of wings increases out of proportion to the increased size of the plane, with the result that the larger the ship becomes the smaller are its payload capacity and its radius of action. Dr. Rumpler, however, believed that the weight of a wing might be kept low if the weight it was to carry were distributed evenly over its span instead of being centered in a single fuselage or hull. His idea was to arrange a number of small airplanes side by side and join their wings. That would lead to a very large airplane with a high carrying capacity and long range —as long a range, in fact, as that of each of the individual airplanes forming the units of the large one.

This is the principle on which the large trans-oceanic flying boat he now intends building has been designed. Before the design reached its present state of development, it of course went through many intermediate stages. Dr. Rumpler at one time, true to his original idea, intended building a ship with four hulls and a single huge wing above them containing the passenger quarters and the engines. Because in a heavy sea, however, the four individual hulls would have imposed too great stresses on the wing structure uniting them, the present arrangement, which consists of only two hulls, was adopted. Leading scientists in Germany who have studied the design appraise it as the best solution of the problem.

Dr. Rumpler has completed his design even to the last detail. The ship is to be an (Continued on page 152)

The FLYING DOLLARS of KANSAS

By Ernest Jones

WHAT ratio air-mindedness? Consider the planes of Kansas.

Kansas' luxury purchasing power among her cities of more than 10,000 population is 40 per cent below the United States average. For towns under 10,000 and rural districts the percentage is 70 below. The average for the state as a whole is more than 60 per cent below that of the entire United States, according to the *Editor and Publisher* market guide. Her luxury consumption capacity is estimated at 0.58 per cent that of the country as a whole.

Yet, Kansas owns airplanes to the extent of 738 per cent above her share, according to her alleged luxury purchasing ability—thriftless Kansas!

If all the states had followed her example, we should have in all the land some 71,950 airplanes instead of the 9,773 registered by the Department of Commerce at the end of the fiscal year 1929-1930. (All figures regarding the number of airplanes were supplied by the Department of Commerce as of June 30, 1930—Editor.)

Senator Grundy may complain of western "backward states," but he should look at his own. Not only did Pennsylvania fail to approach Kansas' record, but she failed by 54 per cent to buy her quota of the 9,773 planes if luxury purchasing power percentage may be taken as a guide—we are considering *luxury* purchasing power only herein. Perhaps the airplane isn't any longer a luxury, but the facts seem to indicate. Even if airplanes are considered as a luxury, a production of 71,950 would cause no wailing and gnashing on the part of the manufacturers—9,773 civil planes in use in 48 states after 22 years of fabrication isn't anything to brag about.

Putting it in another way, Pennsylvania has but one-fifteenth the planes she should have at Kansas' speed.

Massachusetts is even more backward than Pennsylvania with its one-seventeenth of the Kansas ratio, for she has but 42 per cent of her allotment on the basis of luxury purchasing power. In fact, the whole of New England is included among the "backward states" statistically so far as aeronautics is concerned.

Twenty-one states own fewer airplanes than their percentage of purchasing power would warrant—not to mention the premium paid by Kansas. All of New England, the Middle Atlantic, the East South Central and the South Atlantic states (except Delaware and South Carolina) fall within the shadow of the sluggard. Illinois drops out from the East North Central group to show but 75 per cent of her share on the luxury purchasing power basis.

A study of the statistics provides some interesting problems. Among the 28 progressive states—they might be called in hackneyed phrase, the "air-minded" states—Nevada has the smallest number of airplanes (10) and practically 0.03 per cent of the luxury purchasing power of the United States as a whole—if this rule is to be applied—which latter percentage would give her but three planes. But she has 10—or 3.33 times her quota. If she were to rank with Kansas, with her 738 per cent over the argumentative level—Nevada would have 22.

Does anyone think that 22 airplanes to a state, even like Nevada, represents anything like saturation? Nevada's 22 applied to the other states in proportion would give the 71,950 planes mentioned above. How can we bring the rest of the United States up to Nevada's record—not to mention that of Kansas?

California's sun shines benignly, more or less, on aeronautics according to the claims of the chamber of commerce, and she points with modest pride to the 1,275 airplanes dotting her skies. These represent the biggest percentage of the total planes held by any state. But Cali-

(*Continued from page* 148)

	1	2	3	4	5	6	7
				Ratio to U. S. Per Capita			
	No. of Registered Planes	Per Cent of Total of Registered Planes	Per Cent of U. S. in Luxury Purchase Power	All Incomes	Large Incomes	Ratio of Per Cent Planes to Per Cent Luxury Purchase Power	No. of Planes Each State Should Have on Kansas Basis
The Forward States							
Arizona	35	0.35	0.13	81	30	2.70	94
Arkansas	59	0.60	0.46	30	21	1.30	331
California	1,275	13.04	6.75	198	201	1.93	4,867
Colorado	91	0.93	0.63	112	67	1.47	454
Delaware	38	0.38	0.23	125	115	1.65	166
Idaho	19	0.19	0.09	68	13	2.11	65
Indiana	240	2.45	1.63	80	56	1.50	1,175
Iowa	163	1.66	0.92	71	37	1.80	663
Kansas	419	4.28	0.58	72	30	7.38	419
Louisiana	90	0.92	0.87	55	48	1.05	627
Michigan	518	5.30	3.41	120	93	1.55	2,459
Minnesota	153	1.56	1.21	78	49	1.29	872
Missouri	455	4.65	2.62	84	85	1.77	1,889
Montana	57	0.58	0.17	105	24	3.41	122
Nebraska	234	2.39	0.57	76	42	4.20	411
Nevada	10	0.10	0.03	214	39	3.33	22
New Mexico	18	0.18	0.07	48	14	2.57	50
North Dakota	66	0.67	0.11	46	12	6.09	79
Ohio	578	5.91	5.49	103	99	1.07	3,958
Oklahoma	317	3.24	0.87	44	38	3.72	627
Oregon	108	1.10	0.57	123	75	1.93	411
South Carolina	38	0.38	0.36	25	15	1.06	260
South Dakota	69	0.70	0.13	61	14	5.39	94
Texas	431	4.41	2.17	59	43	2.03	1,565
Utah	40	0.40	0.22	90	47	1.82	159
Washington	186	1.90	0.75	140	54	2.53	540
Wisconsin	229	2.34	1.62	100	62	1.44	1,168
Wyoming	31	0.31	0.11	94	53	2.82	79
28							23,626
The Backward States							
Alabama	44	0.45	0.78	30	29		562
Connecticut	132	1.35	1.99	146	153		1,435
Dist. Columbia	60	0.61	0.86	236	201		620
Florida	112	1.09	1.27	79	116		915
Georgia	57	0.58	0 98	32	29		706
Illinois	709	7.25	9.62	145	163		6,936
Kentucky	56	0.57	1.05	45	42		757
Maine	25	0.25	0.53	84	75		382
Maryland	88	0.91	1.57	98	118		1,131
Massachusetts	247	2.52	5.87	142	168		4,232
Mississippi	24	0.24	0.40	24	17		288
New Hampshire	23	0.23	0.32	109	79		231
New Jersey	297	3.04	4.96	133	168		3,576
New York	1,148	11.74	22.35	168	242		16,114
North Carolina	76	0.77	0.84	36	27		606
Pennsylvania	455	4.65	9.96	119	124		7,181
Rhode Island	34	0.34	0.81	112	140		584
Tennessee	72	0.73	1.01	43	42		728
Vermont	16	0.16	0.21	91	66		151
Virginia	71	0.72	0.93	45	37		670
West Virginia	34	0.34	0.72	73	46		519
21	9,773 *						48,324
* Total includes Alaska, Hawaii and Porto Rico, 23 planes......							71,950

Key to Tabulated Figures

COLUMN 1 shows the actual number of registered planes (licensed and identified) by states, according to Department of Commerce statistics as of June 30, 1930.

COLUMN 2 gives these numbers in percentage of the whole number.

COLUMN 3 furnishes consumer buying ability in the luxury class (luxuries of high unit value) in terms of percentage of the United States.

COLUMNS 4 AND 5 indicate the relationship between the number of incomes per capita for each state and the number of incomes per capita for the United States. The first of these two columns shows this relationship for "all incomes" and the second for "large incomes" (over $10,000).

COLUMN 6 shows ratio between the state percentage of planes in actual use and the state percentage of consumer buying ability in the luxury class.

COLUMN 7 gives the number of planes each state would have on the basis of Kansas' ratio.

The TREND of the TIMES

By

David Lawrence

In this, the second of a series of articles on current business trends appearing monthly in Aero Digest, Mr. Lawrence discusses some of the factors in present economic conditions and their significance in the field of world commerce

THE difference between a pessimist and an optimist nowadays is that the former in his bewilderment is unable to perceive the direction or currents of the business reorganization and readjustment through which we are passing, while the latter, full of hope not always justified, sees clearly the job ahead and proceeds to do it.

This is an era in which we can misjudge very easily the point of view of those who insist upon drastic rearrangement or revision of existing methods in business. We may criticize them for their curtailments or their restriction on expansion, but so far as they face the painful truths of business reconstruction, they are, perhaps, our best advisers.

For the truth is that many people sit around talking about the business depression as if it were a mysterious thing which must right itself sooner or later whenever mass psychology lifts the morale of the country to the level of an artificially achieved prosperity. It is so easy to lose confidence when uncertainty is encountered. Nor can we call men lacking in courage who hesitate without knowing what is the next step to take in face of diminished revenues and falling profits.

The long look ahead is not easy. Most business men think in terms of a calendar year and a good many more in terms of quarterly periods. The test, of course, is the economic soundness of business—the demand for a product. Will such demand continue? Is the saturation point being reached? What new industries are likely to come in to compete? Business brains need never be devoted to a single industry, nor is there anything disgraceful about the abandonment of an industry that cannot be made efficient or profitable when its field is invaded.

Businesses and industries are so interrelated nowadays that the whole economic structure suffers if an important few are disturbed. We hear much talk about "surpluses"—as if all our troubles could be cured the instant a surplus is removed. The period of reorganization is costly and American business would really have been in serious straits had it not possessed the reserves to finance and maintain itself for the last year. Credit is the keystone of the arch. American business either has borrowed enough money through securities issued, or else can borrow from the surpluses in its own treasury in order to meet deficits in these critical moments.

Supposing the whole country could have had a reserve, or rather a surplus profit, from which to draw in the emergency? Supposing all the unemployed had had wages enough saved up for at least two years? How long would they have stayed unemployed? They would have been spending their earnings for the necessities of life and there would have been relatively little privation.

To put it another way—if somebody could have devised a way to finance the present depression by a system of insurance in vogue for a long period of time, much after the fashion of the suggestions now being made for old age pensions, and frequently called "unemployment insurance," the spending power of the country would have been little impaired. It is a vicious circle—this unemployment, on the one hand, and diminished purchasing power, on the other. If everybody out of work today were suddenly put to work, the purchasing power of the country would soon approach normal. New wants would be found. New services would have to be rendered as tastes changed. The industries, however, that had approached the saturation point would be in serious difficulties just the same. The answer to those industries near saturation of demand lies in consolidation of units and turning their resources and facilities into new lines.

This may mean a revision of the Sherman antitrust law. The December session of Congress will see the subject thoroughly canvassed.

The year 1930 is a milestone in the progress of man throughout the world. The satisfaction of human desires is an endless process in which billions are earned annually. The automobile, the movie, the sound picture, the miniature golf course, and all the various appliances that have come into being in an improvement of household conditions, are evidences of the ingenuity of man in meeting new economic conditions from era to era.

This year represents a turning point in the sense that in every country the practical facts of economics are everywhere being recognized in their naked truth. So also is the interrelationship of nations being made clearer than ever before. Communication has knit together the finances and resources of the world. Economic friction has caused many a war. Economic coöperation with a bit of reciprocity thrown in, is going to rearrange the economic fortunes and destinies of all peoples.

Europe is, at the moment, struggling with economic reorganization. South America paid for her economic distress in revolutionary disturbances. Russia is trying a unique economic experiment. America, powerful leader, is challenged by a severe unemployment at home which will not be solved for many months to come. The generosity of the American people will tide over the distress of millions of unhappy citizens, and abundant capital and reserves are making it possible for the transition period in industry and business to be carried through without a major collapse or catastrophe.

EDITORIALS

SHARE YOUR WISDOM

SERIOUS problems must be solved by the American aeronautical industry during the next two years. Many men are thinking of these problems now and no doubt several are duplicating the thoughts of others. This, of course, is not undesirable; but we should all gain if each were conscious of the mental roads the other fellow was exploring. We might get from him information which would help us on our own investigative journeys; we, in turn, might give him something which would help him to get over the hill.

Free and copious exchange of ideas would do much to solve not only many a man's individual enigmas, but some of the major problems of the industry. If from the minds of company executives, pilots and everybody else connected with the industry we could gather together that which they have learned but do not tell, much good would accrue to all of us.

Therefore, AERO DIGEST, being in a favorable situation for the performance of this service, offers its editorial pages as a forum for statement and discussion. Send in your own ideas. Induce the other chap to send in his. When you see his views in print and have thoughts of your own upon the same subject, write us your comments. "Our Readers Air Their Views," will be a new department in this magazine.

Here is a chance to air your views for the general good of the industry in which you and we are so vitally interested.

WHAT'S WRONG WITH CRITICS

AN ARTICLE by one Bogart Rogers entitled "What's Wrong with Aviation?" appeared in the November 22nd issue of the weekly *Liberty,* which usually is enterprising, accurate and fair-minded. In the subject which he chose, the writer had an opportunity to present a valuable analysis of conditions in aviation, but unfortunately, instead of taking advantage of it, produced an ignoble example of evident bias. Apparently he sought not to explain what really is wrong with aviation, but to prove that nothing is right with it. Any dissertation so grossly negative must be classified as largely unreliable and therefore worthless, even though some of the faults cited do actually exist.

For that matter, however, even the most generous analysis of any modern industry involving equally wide range, equal capital investment and equally numerous personnel in all branches inevitably must reveal some unworthy individuals and untoward incidents.

But no fundamental faults exist in the air industry which cannot and will not be overcome by time and experience. This consideration the writer of *Liberty's* article overlooks entirely, obviously intending, instead, to convince uninformed readers that everything is wrong and nothing right in American aviation, an immoral, unjustified point of view. That certain stock issues purporting to give the American public an opportunity to participate in the inevitable profits of this most wonderful and promising of human activities have turned out to be worthless is unquestionably true. But in this respect the aviation industry does not differ from the automotive, radio, and many other industries. Certainly, well-informed people have not forgotten the early scandals involving railway stocks. Bogart Rogers writes as if he never read of Black Friday. The airplane had not been invented then, but stock swindlers had. Admittedly, many bad airplanes have been built, but likewise bad locomotive engines, bad motor cars and bad radio sets also have been built.

As an industry grows older, manufacturers learn much from the unfortunate experience of early predecessors in it. That (as the *Liberty* assault says) the imperfectly designed planes of some of the early makers did not sell, is more a credit to the good sense of the airplane buying public than a stain upon the industry. No doubt also an absurd emphasis has been laid, with much ridiculous ballyhoo, upon stunt flying, but this usually has been less the fault of the industry than of the aspirations of those individuals anxious to break into the front pages who always infect society. How many lame-brained stuntists did early motor car enterprise reveal to a shocked world?

In order to reach an honest judgment on the present status of the aviation industry, it is essential that consideration be given to the excellence of its product today and the real service which it now is rendering. *Liberty's* writer, because he neglects to present any facts upon the constructive side, paints a picture quite as false as any that the wildest and most undesirable of the ballyhoo men ever have presented as the result of paid enthusiasm. Rogers writes: "For your own amusement compare airplane development with that during the past few years in radio."

We should hesitate to rip the new art of radio unfairly up the back, but static, distortion and all the other imperfections which even the most concerted scientific research has been unable even yet wholly to eliminate might give a writer as unfair as Rogers just the chance he would glory in. Moreover, the circumstance that major radio programs are still sold out to tooth paste and food product manufacturers would offer him another opportunity, if he turned his talents for misapprehension upon broadcasting as he has turned them upon aviation. Yet, these things are making the development of radio a possibility. In a few years this medium of communication will be the world's greatest educational and entertainment factor, as aviation will be its greatest transport medium. Certainly the early business history of radio was more redolent of stock-dumpings, bankruptcies, over-expansions and other evils than the early business history of aviation. Such experiences are inevitable to all young industries which appeal vividly to the imagination. Always they attract both crooks and fools. But they also attract honest, enterprising and constructive men.

Liberty's author, possibly a victim of the general depression, was probably merely over-anxious to insure a sale of a future story and realized the market value of sensationalism. We are sorry that he got away with it, but accidents will happen in the best regulated editorial rooms.

REAL FLYING GETTING SAFER

ELSEWHERE in these editorials we refer to foolish flying and its silly, yet dreadful, casualty list. In proportion to the number of miles flown, air accidents are actually decreasing, even though it may not be possible to eliminate from the casualty list all or even any of the damnfool mishaps.

Secretary Young's semi-annual report shows an inspiring total of miles flown by civil aircraft in America between January and June, 1930. The total of 66,669,928 of transport and miscellaneous operations is an increase of very nearly twelve and a half million miles over the previous year. And twelve million miles would be found to be a real long journey if some one of aviation's critics were compelled to make it on his feet in a new pair of shoes.

Of course, the really important matter to the industry is safety of passenger carriage by professional pilots upon transport lines. When Colonel Young reports that only one fatality occurred for each 1,400,000 miles flown on regular lines during the period in question, we find in his words justification for an optimism stronger than the distress we feel as a result of the slight increase in the accident ratio for "miscellaneous flying," an increase caused by the reckless antics of inexperienced pilots and older fliers determined to display their skill in stunts.

In aviation, as in everything else, horse sense will win. In fact, so far as scheduled operations are concerned, it won splendidly during the first six months of 1930.

ORGANIZATION, WISE AND OTHERWISE

THE Brotherhood of Locomotive Engineers is trying to tempt the nation's aircraft pilots into membership, using as a bait the Brotherhood's existing insurance feature, the rate of which is $30 per $1,000. Considered in addition to other proffered benefits, this offer of membership may seem tempting. Yet, under analysis, these purported advantages disintegrate. One or two insurance plans for pilots recently have blown up, to the benefit (perhaps) of their promoters but to the pilots' loss.

The pilots now have two admirably strong organizations of their own, the National Air Pilots' Association and, on the West Coast, the Professional Pilots' Association. Time undoubtedly will bring these two groups together, producing one body of decided strength and benefit. Various accident policies now available for transport pilots indicate $25 per $1,000 as a good average rate. Moreover, policies for men engaged in certain selected types of flying are being written at a rate as low as $18, and only a few classes confined to pilots whose work is generally acknowledged to be extra hazardous, as those flying the air mail, are designated at a rate higher than that suggested by the Brotherhood of Locomotive Engineers. So the proposition to professional aviators of that wholly external trade union is not as philanthropic as at first glance it might seem.

Piloting is a profession, not a trade. The proportion of those following it who could and would join the Brotherhood would be so small as to make their voice in the conduct of its affairs negligible. And that situation would be a tremendous handicap to those pilots who had become members.

Insurance in the United States is a business, and a big business, under state and Federal control. After many errors and scandals, it has become admirably organized and is now conducting extensive research on flying conditions and risks. Colonel Robbins, at one time Assistant Secretary of War and now president of the Cedar Rapids Life Insurance Company, stated in an address at Chicago that insurance companies now realize that the element of danger in aviation was at one time greatly overestimated and that new discoveries of additional safety devices are so frequent that he very much doubts if life insurance experts realize what progress is being made. He clearly implies that they will do well if they learn and get into the field at reasonable rates. Of course, in view of his position, this means that they will do precisely that—and on a competitive basis which will be to the advantage of their customers.

Under existing circumstances we warn all pilots to watch their step when urged, by those not directly interested in the future of the air, to proceed on any course. Especial caution should be exercised when the urging comes from labor unions naturally disturbed by the fast growth of a new transport industry which may decrease the potentiality of that in which their members have been trained. Such men, naturally, must be at least subconsciously impressed with the hope that air transport eventually will fail.

Obviously it is mere common sense that pilots should stick steadfastly to their own organizations operated by those familiar with the conditions which air pilots must meet and not by those connected with one of the trades which sooner or later inevitably must diminish in importance as the result of aeronautical progress. Pilots sticking to their own organizations will be members of bodies governed by by-laws which they themselves devise and pass, subject to their own revision when changing conditions in the air (not on the railways) indicate such a necessity. If the insurance offered by their own organizations is not sufficient, they can go to one of the several recognized insurance companies now offering them good policies.

FOOL FLYING MEANS FOOL ACCIDENTS

THE accident figures for the first six months of 1930 indicate that scheduled transport flying is steadily becoming safer and more reliable. The greatest enemy of these two desirable factors in this branch of aviation is weather, which no man can control but which flying man has measurably conquered and eventually will fully overcome.

For flying as a whole, however, we find a different classification in the accident-cause column. Not to weather but to incompetent piloting is more than half (57.14 per cent) of all accidents attributed.

Moreover, as compared with the same period in 1929, mileage of miscellaneous flying per fatal accident decreased in the first six months of 1930. Indeed, it decreased alarmingly from 398,305 to 359,494.

What do these facts indicate? Probably that more inexperienced pilots have been flying. Certainly that the campaign against foolhardy flying has largely been ignored.

In aviation, experience is too often a tragic teacher. Therefore the novice pilot who does not heed the warning of men much older in the game, men whose thousands of hours in the air have taught them the necessity of caution, is a truant in the school of flying. Moreover, he exposes himself and his passengers to unnecessary hazards. And it is he, with his foolhardy spectacular flying, who is principally responsible for that 57.14 per cent.

Damnfool flying by those experienced enough to know far better is far more to be condemned than stupid flying by those too inexperienced to recognize danger when they face it. If it were only that the damnfool flier is killed by this idotic brand of aviation, we should have no cause to complain. But the crack-up even of a prize damnfool injures aviation's name. We must strive continually to find new ways to keep the damnfools down on solid earth, either by eliminating them through training or by stern restrictive measures.

THE COLLEGE FLYING FRATERNITY

By Donald Bolton

In discussing the possibilities of college flying in the November AERO DIGEST, Mr. Bolton briefly referred to individual club organization as a sub-requisite to national association as a means to the successful introduction of practical aviation in the universities. In the present article that theme is expanded and several of the more important aspects of flying club organization are described in detail.

WHEN college students conceive the idea of forming a flying club, it is essential that they recognize fully the seriousness of the undertaking before them. A flying club, unlike any other college society, demands a considerable appropriation of money, expert business management, shrewd administration and supervision. It is of the utmost importance to safeguard the initial expenditures, that the organization does not dissolve after a few weeks of activity. The project must *not* fail, or there will be serious monetary losses to some who can ill afford it. The foundations of the body must be set upon bedrock, and the framework stressed to withstand the most powerful forces put upon it. It is evident that the fundamental law must be carefully schemed; and must be so comprehensive that it will embrace all phases of club activity, and so explicit that no doubt can exist concerning its significance. The constitution must be satisfactory, not only for its own sake, but to pass the investigation of the college student council. Usually the sanction of the latter body is necessary before the organization is officially recognized on the campus or by outsiders. Space does not permit the insertion of a model constitution here, but I should be pleased to furnish a typical form to any interested college group.

During the framing of the club's constitution, it is necessary to determine the individual assessment for dues. This is a very difficult undertaking which involves an extremely painstaking cost analysis of the whole financial situation. The rate of charge should be the minimum sum necessary to carry all expenses and still leave a small balance for safety. Dues may range from as low as twenty-five cents to as high as one dollar per week. The latter is the highest of which I have heard in a collegiate flying club operating a ship. I believe, therefore, it is safe to assume that that sum is the maximum necessary successfully to support the activities of a group of approximately forty members.

New York University, with an organization of thirty-five members, flew an Eaglerock with a Hisso-A engine. The 150-horsepower engine was rather more powerful than necessary or expedient, and put a heavier burden upon the treasury than a more appropriate ninety-horsepower powerplant because of the greater fuel consumption of the former. Starting with a small endowment of $200 left by a defunct glider club of the past and charging one dollar a week dues and eight dollars an hour for flying time, the N.Y.U. Flying Club last year piled up enough time to win fourth place in the Loening Competition. During this nine-month period the engine was given two complete overhauls and minor replacements were made, and the plane itself was repaired twice after slight damage. At the end of the school year the treasury showed a balance of the original endowment plus the Loening award, and a small profit in addition. Considering that the flying time rates were as low as possible—in fact, less than one-third standard flying instruction rates—it is a fine record, indicative of what can be accomplished with a small amount of money.

Last year was the first time that N.Y.U. had had the use of a plane. Considering the lack of experienced personnel, the club did remarkably well. However, with a little more knowledge of flying club practice, a better record could have been maintained. For instance, if a flying schedule had been carefully formed and carried out to the letter, a great deal of needless expense could have been avoided. Mathew Mack, the treasurer, after investigating costs, reported that when the ship was operated for periods of four hours or more at a time, a profit showed on the books, but when it was flown for periods of shorter duration, a deficit resulted. This was discovered to be because of the cost of warming up the engine many times for innumerable short hops. With a high-powered engine the gas consumed for idling can incur a great expense in a year's time. The only way that costs may be relieved is to conform religiously to the schedule. Every member wishing to fly should make appointments in advance and, weather permitting, take flights only at those previously specified times. Indifference to this practice may mean the difference between profit and loss at the end of the season.

Some college flying clubs are composed of so many members that they are faced with the serious problem of determining who shall fly. It is evident that, with one ship, not more than twenty men can safely do much flying. To obtain Department of Commerce approval flying schools are not allowed to give instruction to more than fifteen students on one ship, and although the colleges are not compelled by law to abide by this ruling, it would be wise for them to recognize its purpose. The University of Detroit has a custom whereby every student admitted to the school of aeronautics is automatically made a member of the flying club. The organization consequently numbers more than 400 men and women. It would be ridiculous to contemplate for a moment giving instruction to that many people; a whole squadron of planes would be necessary for their accommodation. Detroit has no ship at present, but when she does get it she will be confronted with a serious problem. N.Y.U. used an eligibility system which adjusted the situation admirably. Every person, other than charter members, was considered a candidate for membership. During the first half year aspirants attended lectures given at the club meetings on aeronautical subjects. At the end of the semester they were given a written examination on the principal subjects of the lectures with the understanding that the highest passing fifteen would be eligible to fly, providing they successfully passed the Department of Commerce physical exam. Thereafter an appointed Character Committee passed upon all candidates and admitted those whose interest was great enough to endure a four-month period of ship washing and valve grinding, and general drudgery. Thus those who were physically or tempermentally unfitted to fly were successfully eliminated and the eager, well adapted ones accepted. However, everyone, including candidates, had the joy-hopping privileges at reduced rates.

Of the many important factors in flying club work, safety is undoubtedly the most important of all. Every club should make special attempts to safeguard members at all times, in the air and on the ground. At the present time, while the college flying movement. (*Continued on page* 150)

WEATHER CONSIDERATIONS FOR TRANS-ATLANTIC AIR ROUTES

By Dr. James H. Kimball

Meteorologist, New York Weather Bureau

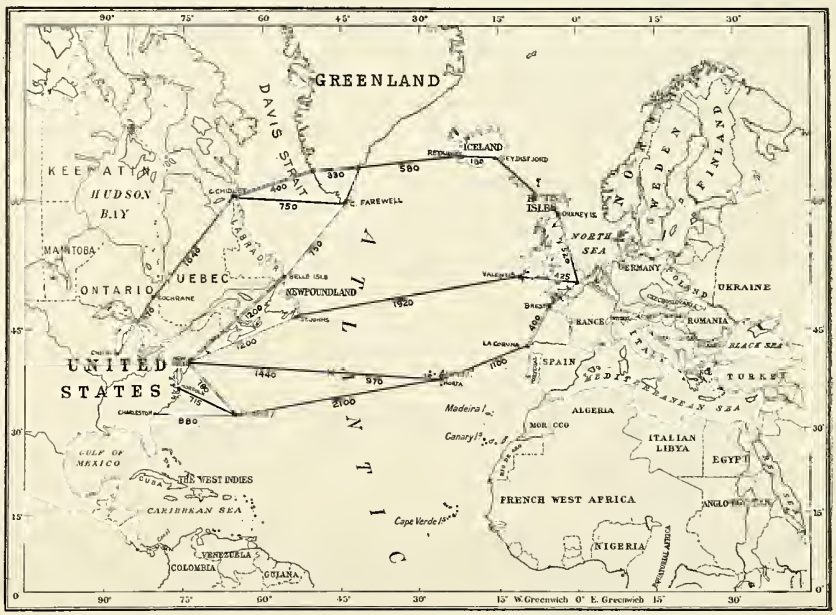
RIGHT now, as this is being written, the executives of three great international airlines are sitting together in conference in New York City, a conference that has as one of its features the starting of a trans-Atlantic air service. In immediate prospect, I am informed, is the first leg of this new and ambitious plan, an air mail line between the United States and Bermuda. The French, who are sitting in at the conference table through their representative M. Andre Bouilloux La Font, managing director of Aeropostale, have for a long time been studying trans-Atlantic flying with the purpose in mind of sending their planes across the South Atlantic from the French possessions in West Africa to Natal, Brazil, there to connect with Aeropostale's lines up and down the coast. Indeed, a large part of this route between Paris and the new world is under operation today. The French air argosies carry the mail and express out from Le Bourget, down across France and the Mediterranean, and thence to St. Louis, Senegal. The water jump at present is being made in fast dispatch boats, but the French designers are at work on great seaplanes destined, they hope, to follow the path through the sky blazed three years ago by Coste and LeBrix. Weather is fairly favorable for this operation, most of the route lying far to the south of the courses of general storms.

The northward extension of this service suggests a line to the Azores. The distance from Lisbon to Horta is about 1,100 miles. The distance from Horta to La Coruna, on the northwestern shore of Spain, is also about 1,100 miles and three hours less flying from Paris. A regular service over 1,100 miles of water in which, on the outward passage, the pilots must strike a tiny dot in the broad ocean is an ambitious project, especially when much of the year westerly winds will face the fliers; yet I am informed from creditable sources that such a service is feasible with equipment that can be built today. Bermuda lies near the thirty-second parallel about 780 miles airline from New York, about 715 miles from Norfolk and about 880 miles from Charleston, South Carolina, which Mr. W. Irving Glover, Assistant Postmaster General in charge of Air Mail, is quoted as naming the logical spot for the western terminal of such a line.

Granting then that both the Azores-European link of this service and the United States-Bermuda link are feasible with equipment that exists today, there remains the largest water jump of all terminating at both ends in very small specks of land 2,100 miles apart. That looks to be something of a problem for everyone concerned — designers, engine builders, operators and navigators. Furthermore, with the present setup of ocean travel, there are comparatively few ships in that area from which weather reports can be obtained with sufficient regularity to guarantee an efficient weather service for regular plane operation. The area north of Bermuda and the Azores over the western half of the ocean, where all the principal trans-Atlantic steamship lines operate, gives us the bulk of our ocean weather information. For example, in one day in the last month the New York bureau received by early afternoon definite reports from twenty-three ships and these reports made it possible to plot an accurate map of North Atlantic weather—incidentally, a map that showed conditions that would be very uncomfortable for any airplane over the ocean on that particular day.

It would not be possible to obtain such a mass of information on the area between Horta and Bermuda at any time of year, and it seems reasonable to say that such an airline must wait until some method is devised for learning before a plane takes off just what the pilot can expect in the way of weather over the route.

There are, of course, many conditions that must enter into the selection of a route and weather is just one of them. Obviously, an extension over the Atlantic of Imperial Airways is a logical one. Imperial flies all over Europe and to India with some short breaks in the line. Plans are in existence for extending the lines to Australia, and already the London-to-Cape Town airway is plotted and a part of it is being flown. In the Western Hemisphere an extension of this service from Bermuda, Nassau, Kingston, British Honduras and British Guiana, as well as Canada, Newfoundland and (*Continued on page* 124)



Map of the North Atlantic showing air routes and distances in statute miles

REDUCING
AIRPLANE PRODUCTION
COSTS

By DWIGHT HUNTINGTON

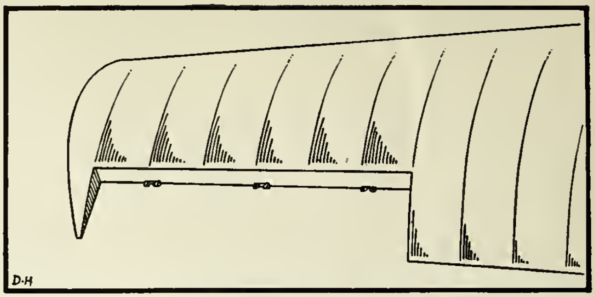


Figure 1. Overhanging wing tip with slightly inset aileron

IN a previous article I pointed out that, by carefully choosing the simpler structural types of planes for manufacture and by coördinating the designs of related models, a manufacturer may materially reduce production costs.

In the matter of detail design, too, large savings may be effected as a result of a thorough study of the structure, through the elimination of unnecessary members and the simplification of requisite ones. To the manufacturer producing only one or two planes a week, a cost reduction of $15 or so per ship—through the elimination of a couple of members, let us say—may appear trivial, yet his designer need but effect two or three such economies and he will then have written off his own salary. The larger the production schedule of course, the greater the saving will be.

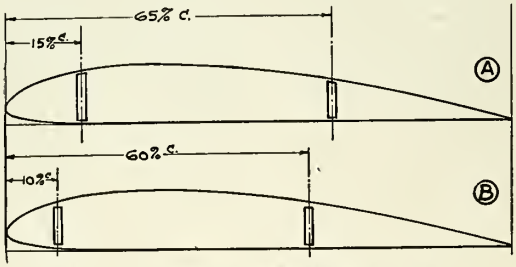


Figure 2. (A) Wing with spars of two sizes; (B) wing designed with identical spars

This matter of economical detail design either in a new plane or in the revamping of an existing model is largely dependent upon the amount of the designer's practical experience, and many small companies that employ only one or two designers, often of very limited experience, could profitably call in an experienced consultant occasionally to go over a design with production economy in view. In several instances at the present time, this policy would pay well the manufacturers adopting it.

Obviously, airplane structures are so diversified that any attempt fully to cover the subject of production economies would be extremely laborious. The present effort, therefore, will be directed toward pointing out a few typical design revisions.

Take for example the overhanging wing tip shown in Figure 1, which is probably a hold-over from the Panther type aileron, yet which has none of the advantages and all the disadvantages of the latter. The use of a slightly inset aileron does not decrease the bending moment to any appreciable extent, and aileron flutter probably is more apt to be the result of loose hinge or control pins or slack cables, or traceable to overbalancing, than of tip vortices acting on so small an area. Yet the adoption of this style wing tip prevents the use of the slip-on envelope type of wing cover, which is superior to, and cheaper than, the sewed-on-the-job cover. It is likewise far superior to the latter from the standpoint of replacement, generally effected by the owner of the plane. Another disadvantage of the overhanging tip exists in the fouling of the aileron by the projecting portion of the wing when the latter is smashed against the hangar, as frequently happens. Instances of planes grounded temporarily for this reason have been observed, whereas had the tip portion been part of the aileron the result would have been just as unsightly but nevertheless useful. In another instance the breaking of an axle on a biplane brought the lower wing tip into contact with the ground, with the result that the overhanging portion was broken off. Had it been part of the aileron, it would have merely flexed upward and suffered no damage. The overhanging wing tip is merely an expensive fad and simplification here will save many dollars for manufacturers.

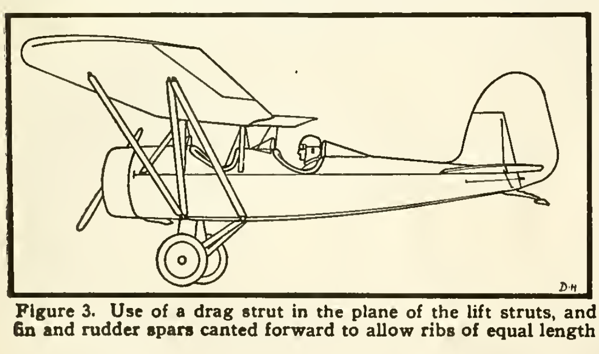


Figure 3. Use of a drag strut in the plane of the lift struts, and fin and rudder spars canted forward to allow ribs of equal length

Another and more profitable example of simplification lies in the design and production of wing spars. At the present time, two-spar construction as shown in Figure 2-A is practically standard on the large majority of planes, particularly on those under 5,000 pounds gross weight. This generally means that four different spars—front and rear, right and left—are used in monoplane types. There is no good reason, however, why one spar should not suffice for all four positions, in the majority of existing models. Even with the use of rectangular wood spars, the production economy is well worth while, and the more expensive the spar construction utilized, the greater the saving. In the case of spars of built-up, girder construction, or of the tapered variety, the monetary saving will be considerable. Then, too, the matter of spar fittings simplification should not be ignored. Identical spars will permit of similar fittings—with further production economies.

The factors which enter into the design of a wing with identical spars, as shown in Figure 2-B, are the shape of the airfoil section, the center of pressure movement, the general design of the lift and drag trusses and the load

factors to be used. It is a simple matter to check the percentage of total beam load on each spar in its design condition, resulting from center of pressure travel, against the shape of the airfoil and to find by trial and error, in many commonly used airfoil sections, the permissible locations of both spars.

Taking the Clark Y airfoil section as a typical example, let us assume that the front spar is placed at 10 per cent and the rear spar at 60 per cent of the chord from the leading edge. The respective heights of the section at these positions are 9.18 per cent and 9.15 per cent of the chord, a variation of only one-third of one per cent. It is, therefore, evident that spars of equal depth may be utilized to advantage. And since the center of pressure position for the high attack or front spar design condition is 31 per cent of the chord, that spar will take 58 per cent of the running wing load. Similarly in the low attack or rear spar design condition the center of pressure is 51 per cent of the chord and the rear spar will then take 82 per cent of the wing load. Department of Commerce load factors for airplanes under 2500 pounds gross weight are 6.5 for high attack, 4.225 for low attack conditions, and since the wing load is unity we may readily compare the design loads for the spars as follows:

$$\text{Front spar} = 0.58 \times 6.5 = 3.77$$
$$\text{Rear spar} = 0.82 \times 4.225 = 3.46$$

The difference of nine per cent in beam loads may of course be reduced by further shifting of positions, providing the airfoil section has been drawn to scale so that all the ordinates are available. For the present the difference is considered sufficiently small to serve the purpose of an example.

In cases where an external lift truss is utilized and the tension members are placed in the vertical planes of their respective spars, the axial (compressive) loads in the latter will vary in direct proportion with the beam loads. By juggling the lift truss members in conjunction with the design of the drag truss, little difficulty will be encountered in equalizing the axial loads in the two spars. By placing one spar under slightly higher combined beam and axial loads than the other, a single spar analysis will suffice and spar production cost will be materially reduced. It is of course assumed that the shape of the wing tip in plan view is such as to permit the use of spars of equal length. In some instances it will be found that identical spars will work out slightly heavier than dissimilar ones, yet in view of the large saving in production costs, the very slight increase in weight clearly will be justified.

A fair example of the possible elimination of members is to be found in monoplanes which include a drag strut in the plane of the lift struts, as indicated in Figure 3. At first glance such a structure appears to be over-braced and occasionally this may be the case. At best the use of this third strut necessitates a thorough analysis in order that the drag loads may be satisfactorily accounted for under any condition of rigging. In some instances the third or drag strut has been added as an afterthought—when it was learned that without it the wing tips could be rocked fore and aft on the fuselage, in a horizontal plane, to a dangerous extent. In such an instance, the presence of the drag strut is invariably due to the fact that the center section or cabane struts, or their follow-through members in the fuselage, were improperly designed in the first place. Instead of attacking the problem at its source, the designer has taken an easier course, but in so doing he has added perhaps 20 pounds of weight and several pounds of resistance to the ship, while boosting the manufacturing cost perhaps $25. A redesign of the struts attaching the wings to the fuselage will enable either of the two rear members to be eliminated, assuming of course that the internal drag truss is investigated at the same time.

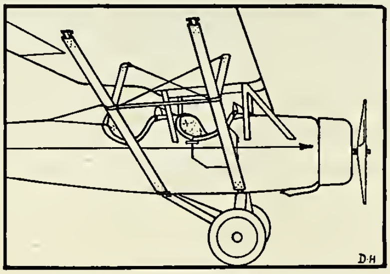


Figure 4. An over-braced structure

Bringing the lift struts down to the lower longerons in the vertical planes of their respective spars has the advantage of placing no chord loads in the wing due to the lift truss, whereas bringing both struts down to a common point enables the designer to eliminate two fuselage fittings and permits a simple folding wing method to be used if desired for housing economy. Generally, too, access to the ship is easier and visibility is increased.

A clear example of an over-braced structure is indicated in Figure 4 in which a strut and two wires are used to interconnect continuous streamline tube lift struts at the points of attachment of the customary deflection struts. Inasmuch as the moment of inertia of a streamline tube about its short axis is many times that about its long axis, it will generally be found that the interconnecting strut and wires are unnecessary, with a consequent saving in production costs. It is well for the inexperienced designer to bear constantly in mind the fact that unnecessary members in an airplane not only do not add to the strength of the structure, but indirectly subtract from it because of the increased weight.

Turning our attention to the empennage unit, we discern another possibility for production economy. The steel tube rib shown in Figure 5-A is not only two to three times as heavy as the sheet rib illustrated in Figure 5-B, but the material cost of the former will be from five to ten times that of the latter. If, therefore, the elevator and rudder ribs are made the same length so that a dozen or more of these are required per ship, the production schedule should soon justify the stamping of these members, resulting in a healthy cut in labor costs as well. The rudder shown in Figure 3 illustrates what may be accomplished in the way of a pleasing contour while retaining the production advantages of ribs of equal length, the fin and rudder spars being canted slightly forward to assist in attaining this end.

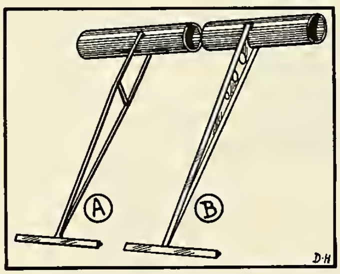


Fig. 5. (A) Steel tube rib; and (B) sheet rib for empennage unit

The foregoing examples of methods to reduce manufacturing costs have been taken at random, but careful designers can effect large savings for their companies by scrutinizing every part with an eye for further simplification. Likewise, the manufacturers themselves can lend considerable encouragement to this worth-while endeavor by computing the monetary value of design improvements and rewarding their designers accordingly.

THE RESOLUTION OF WING AIR FLOW

ARTICLE SIX OF A SERIES ON AERODYNAMICS

By Dr. Max M. Munk

THE longest spread between the left and right wing tips is called the span of a wing. The width of the wing in the direction of flight is called its chord. The chord is generally different at various stations along the span, and it becomes necessary therefore to define an average chord. This is the wing area divided by the span. In literature on aerodynamics the ratio of the span to this average chord is also often computed. It is called the aspect ratio of the wing or wings. For our purposes, however, in discussing the principles of aerodynamics, we shall chiefly deal with the span itself and seldom with the aspect ratio.

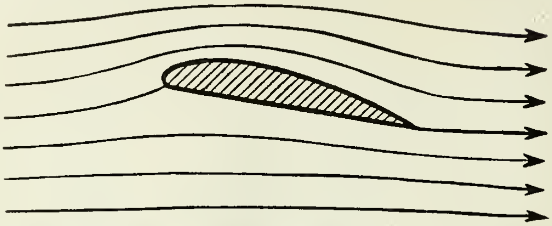
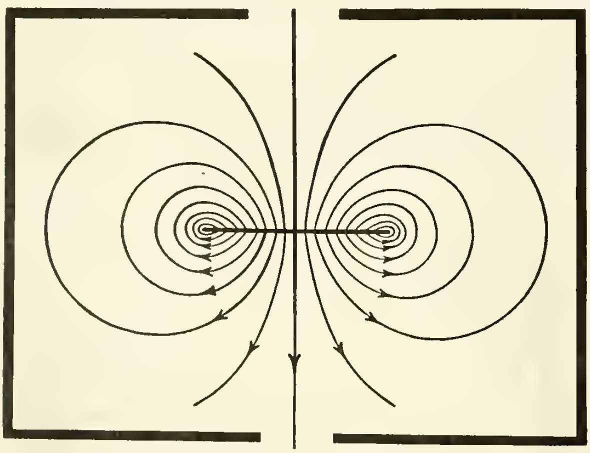


Diagram illustrating typical profile flow of a monoplane

The average chord of biplanes and multiplanes is computed by dividing the entire wing surface of all wings by the longest span. Because there are two or more spans, the wing arrangement is characterized in many respects by its view seen from front or rear. This we call span view. The span view of the biplane or multiplane takes the place of the simple span of the monoplane, and its main dimension is again the longest span spread.

Span and chord, as the two principal geometric dimensions of the wing, call forth separately the chief properties of the air motion produced by the wing. We know from previous discussions that the wing produces lift in the proportion that it changes the vertical velocity component of the air. The complete velocity distribution of the air produced by the wing is the key to all computations of aerodynamic wing forces. Let us, therefore, in considering this wing air flow in greater detail first explain the method invented for grasping this complicated motion, for understanding its nature, and for distinguishing its important characteristics. Let us try to get a clear picture of the intricate manner in which the air is set in motion by the wing.



Typical span view flow of a monoplane. The horizontal line represents the span of the wing

The method consists in resolving, or dividing up, the complete or actual motion into two incomplete or component motions. These two component flows are as perfectly blended to form the one actual motion as are copper and zinc to form brass. Nevertheless, they can be understood and computed individually and independently—more easily, in fact, than as compound motion. Consequently, the resolution means in all respects a simplification of the problem. Both flows are further separately used for the computation of separate aerodynamic characteristics of the wing. The two component motions are of an entirely different type. Their individual identities can be distinguished by associating them with the span and the chord respectively.

The subject of this article is, accordingly, the resolution of wing air flow into two component flows: span view flow and wing profile flow. Span view flow takes place in vertical planes parallel to the span and consists essentially in a flowing around the span or spans. Profile flow takes place in vertical planes parallel to the chord, and consists essentially in a flowing around the chord or chords. The division of the complete wing flow into these two component flows is the stepping stone to the science of wing air forces. It is logical, therefore, to contrast the two component flows in order to throw as much light as possible on their characteristics and in order to accustom and familiarize ourselves with the division, so that we will be fully prepared subsequently to study the two flows in detail in separate articles of this series.

The purely geometric viewpoint of the resolution of wing air flow has already been indicated. It consists simply of resolving the motion of the air over and around the wing, as an obstacle, into horizontal and vertical flows, into a flowing over the top and under the bottom, and into a flowing around to left and right. First we must disregard the side motion and concentrate our attention on the motion in longitudinal vertical planes—that is, we must deal with forward motions together with the vertical motions associated with them. After that we must disregard this profile flow and concentrate on side motions together with the vertical motions associated with them—that is, the span view motions. Both flows have their own vertical velocity components, and their superposition gives the actual flow. This geometric explanation identifies the two flows. It is not, however, sufficient to explain their full nature.

It was originally suggested that wing air flow be resolved by separating the local features of the flow from the bulk features. The chord is smaller than the span and the details of the wing contour are even smaller. It stands to reason that the influence of the profile is most pronounced in the immediate proximity of (*Continued on page* 142)

THE TOWNEND RING

Comments on the Progressive Research conducted by H. C. H. Towend, Originator of the Successful Streamline Cowl for Reducing the Drag of Air-cooled Engines.

THE October issue of the Royal Aeronautical Society *Journal* features an instructive paper by Mr. H. C. H. Townend on the subject of the Townend Ring, a streamline cowl for radial engines which has attracted wide interest as an outstanding development in the field of aeronautical research.

One of the most constructive ideas conceived twenty years ago was the principle of streamlining as applied to aircraft. Although the principle was not entirely new, we were not fully cognizant of its possibilities at that time. Fish and birds are streamlined; ships have been streamlined almost since time immemorial. Nobody can claim priority in discovering the value of streamlining as such. The startling aspect was the magnitude of the improvement obtained through streamlining. The drag of an airship hull is reduced to one-twentieth that of a disc of equal cross-section, merely by careful streamlining. Moreover, a well streamlined section has twenty times the efficiency of the crude wing contours once proposed. During that twenty-year period, improved streamlining has also opened the way to progress in aerodynamic theory. With poor streamlining, air forces are largely governed by air friction, and the effect of the pure mass forces is entirely concealed. With good streamlining, the air forces approach those expected in air without friction, and the theoretical treatment acquires practical significance.

Mr. Townend's work is an example of streamlining in a new connection. It is multiple streamlining, as differentiated from the old-fashioned simple streamlining. The air motion around the main object is not only guided by refining the shape of this object, but in addition by providing auxiliary guides and vanes. This was something entirely new when first applied to wings. The slotted wing device developed by Lachmann and Handley Page is the outstanding application of this method to wings. Mr. Townend, by applying the same principle to fuselage drag reduction, has now obtained results which are highly promising for the future. His work has to do with fuselages with projecting cylinder heads of radial engines. By placing a narrow ring-shaped guide around these cylinder heads, the drag of the fuselage has been reduced by one-third and that of the entire airplane by one-fifth. The ring is cheap, practical, light, easy to fasten, easy to make strong and durable; it does not interfere with the cooling of the engine nor with the visibility of the pilot. In a word, it is a technical improvement throughout.

Mr. Townend's paper is full of instructive information and numerical values. It is most refreshing to read it, not only because of the results which it discusses, but also because the methods used for obtaining them are really interesting. The paper reflects a genuine spirit of investigation. In Mr. Townend we find just the proper coördination of the faith of an inventor and the reasoning of a scientist. This delightful exploration of the *terra nova* of physics absorbs the interest of the reader fully. It is difficult to decide whether one more admires the precise reasoning or the industry of painstaking experiments.

IGNITION SWITCH AND MAGNETO TEST STAND

THE Scintilla Magneto Company, Inc., of Sidney, N. Y., has recently introduced a complete line of radio shielded ignition switches. There are several types of single-engine switches which, though fundamentally similar, embody individual characteristics which make them, as a group, applicable to almost any installation.

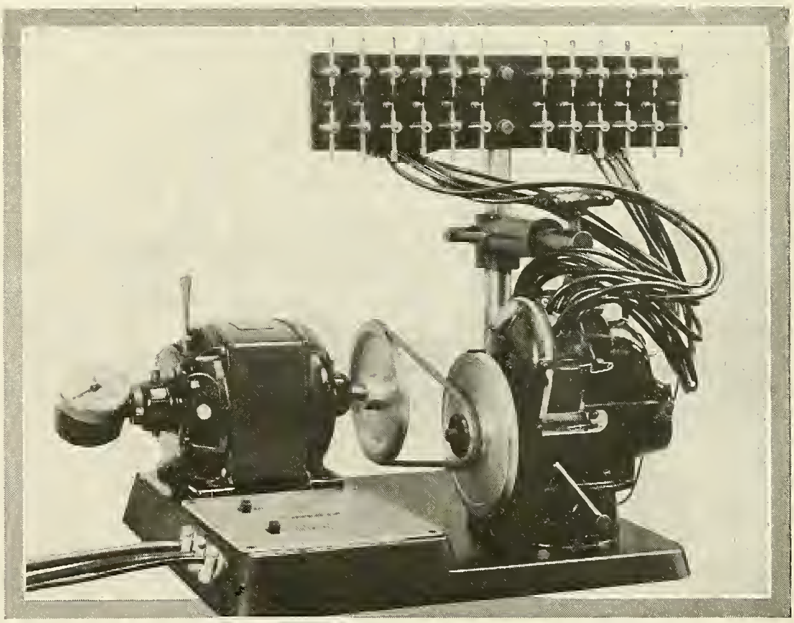
Wires from the magnetos and the booster connections are led through the back of the switch, which is entirely surrounded by a metal cover, by means of an elongated orifice of about one-half inch diameter. A collar provided around this outlet permits positive securing and grounding of the shielded magnetos and booster wires to the switch case.

This switch, in appearance, is quite similar to the switches formerly manufactured by this company. The installation dimensions are the same, and the weight of all the units is approximately 11 ounces, or slightly less than the older switches. Two types of mounting plates are provided, one with three holes and another with four holes which is the standard mounting plate used by the Pioneer Instrument Company.

A new trimotor switch has been produced. This switch is also radio shielded and very compact. Its installation dimensions are the same as the single-engine switches. One of the features of this switch is found in the master control button located centrally, which by being pushed forward cuts out all six magnetos. This tri-engine switch weighs approximately 17 ounces. The Scintilla company expects to have the switch available in the near future in quantities sufficient to meet the requirements of the industry.

An interesting piece of ship equipment recently produced by the Scintilla company is the Magneto Test Stand. Compact and ruggedly constructed for severe shop use, it permits a quick test of Scintilla aircraft magnetos. It is so designed that it runs magnetos either clockwise or anti-clockwise at speeds varying from 70 to 6,000 revolutions per minute.. Power is obtained from a 110-volt A. C. motor, variable in speed and reversible in its rotation. Magneto speeds are read directly from a tachometer mounted on the rear of the motor shaft. Provisions have been made for testing the ground and booster circuits of the magnetos.

This test stand, which is now in production, is intended for service as shop equipment for engine manufacturers, large transport operators and aircraft service stations.



Magneto test stand produced by Scintilla as service shop equipment

SOLAR ALL-METAL SESQUIPLANE

THE Solar all-metal transport is an eight-place cabin sesqui-plane powered with a single Pratt and Whitney Wasp engine, of 420 horsepower at 2,000 revolutions per minute. The ship, manufactured by the Solar Airplane Company of San Diego, Calif., has been approved by the Department of Commerce.

The sesquiplane type was selected to give more rigid bracing of the wing structure than monoplane design permits and at the same time furnish greater aerodynamic efficiency than the conventional biplane. Moreover, the sesquiplane design permits a wide tread landing gear with a minimum of external bracing.

The wing construction is conventional in that it is composed of two spars joined by definite rib structure. Drag bracing is eliminated by the use of corrugated metal covering. The wing spars are of the box beam type built entirely of duralumin, the chord members being angles to which the wing covering is riveted, and the web members being round duralumin tubes arranged so as to form a Warren truss. The wing covering is of corrugated duralumin. The covering on the lower wing is of heavier gauge to prevent damage when the ship is being handled on the ground.

Two advantages of the Solar wing covering are found in the continuous corrugations around the leading edge of the wings and in the fully corrugated wing tips. A new method of corrugation has been developed for both wings and fuselage covering to increase the ease in riveting and to eliminate damage to the covering by forming the rivet heads on a corrugated surface. Unlike the usual continuous corrugations, those on the Solar plane are spaced 1.25 inches apart and have a radius of 3/16 inch, providing a flat portion of metal between each corrugation.

Ailerons are of the Frise type.

The forward interplane struts on each side of the fuselage are constructed from streamlined duralumin tubing 5.43 inches by 2.30 inches by 1.48 inches. The two rear struts are of streamlined duralumin tubing 4.72 inches by 2.0 inches by 95/1000 inch. According to the company, this design has proved to give an unusually rigid structure.

The fuselage is constructed of duralumin tubes and channels, to which is attached the corrugated metal covering. The portion of the fuselage from the rear of the passengers' cabin forward is complete truss construction so arranged that no fuselage members cross window openings. The fuselage to the rear of the passengers' cabin has definite longeron and vertical members. There is no diagonal bracing. The covering takes the sheer load. The forward portion of the fuselage is covered with corrugated duralumin .013 inch thick and the covering for the rear portion is .020 inch in thickness. The fuselage floor girders are I-beam in section, made by riveting duralumin webs .032 inch in thickness to extruded duralumin tees. Riveted to these girders is the corrugated duralumin floor covering .020" thick.

The pilot's cabin is forward of the leading edge of the upper wing. All windows in the pilots' compartment are of shatterproof glass. The side windows may be raised or lowered by means of a crank. Dual wheel controls and rudder pedals are provided for the two pilots' seats. All engine controls are located in the center of the instrument panel, and all flight and engine instruments are visible to both pilots. The stabilizer wheel can be reached by either pilot.

Two gasoline tanks, located in the upper wing, have a total capacity of 110 gallons. The oil tank, holding eight gallons, is located forward of the fire wall. The gasoline tanks are designed to give full gravity feed at all flying angles. An engine-driven fuel pump and an emergency hand pump are also provided. Sight gasoline gauges are located in the pilots' cabin.

The portion of the fuselage forward of the fire wall is protected with a pressure fire extinguisher system, the control valve being located in the pilots' cabin. A hand fire extinguisher is also located in the rear of the passengers' cabin.

The passengers' cabin is 47 inches wide, eight feet nine inches long and five feet one inch in height. Windows are of shatterproof glass. Six adjustable chairs of duralumin tubing upholstered with leather are provided.

The landing gear is constructed of chrome molybdenum steel tubing, heat treated to a strength of 180,000 pounds per square inch. The landing gear tread is 14 feet. Oleo-pneumatic shock absorbers with a total deflection of eight inches, in addition to Bendix wheels with brakes controlled by toe pedals attached to the rudder control, are provided. A tail wheel, equipped with a 12-by-4-inch pneumatic tire and a rubber disk shock absorber unit, is provided.

The empennage is made from a duralumin channel framework over which is riveted a corrugated duralumin covering .013 inch thick. The stabilizer, triangular in plan form, is braced with streamline steel tube extending to the lower fuselage longeron. The stabilizer is adjustable in flight. The in is adjustable on the ground.

To eliminate corrosion, all parts of the structure are given two coats of an oil base Duco primer. All steel parts and fittings are cadmium plated, and all exterior surfaces treated with a coat of aluminum enamel prior to application of the oil base primer. The interiors of all tubes are coated with bitumastic paint. Duco lacquer is applied to all exterior surfaces.

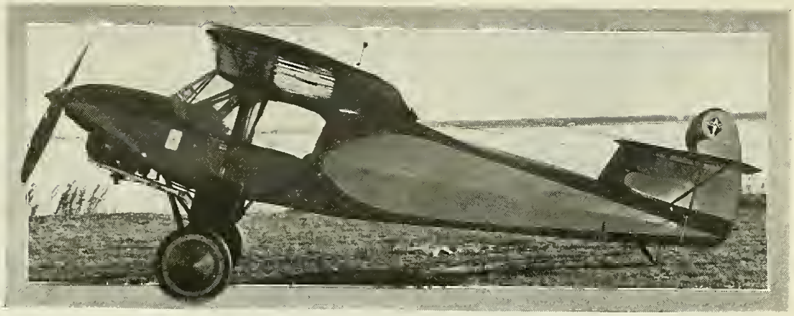
Specifications

Length overall	36 feet
Height overall	10 feet 2 inches
Span, upper wing	56 feet 6 inches
Span, lower wing	18 feet
Chord, upper wing	8 feet, 4 inches
Chord, lower wing	5 feet, 10 inches
Gap	60 inches
Wing area (inc. ailerons)	496.5 square feet
Aileron area	41.6 square feet
Stabilizer area	52.1 square feet
Elevator area	30.2 square feet
Rudder area	15.2 square feet
Fin area	8.8 square feet
Dihedral, upper	2 degrees
Dihedral, lower	0 degrees
Wing loading	11.4 lbs. per sq. ft.
Power loading	13.4 lbs. per sq. ft.
Airfoil section	Göttingen 398
Load Factor H. I	**5.7**
Weight empty	3,665 pounds
Disposable load	1,985 pounds
Gross weight	5,650 pounds
High speed	125 miles per hour
Landing speed	50 miles per hour
Cruising speed	112 miles per hour
Rate of climb (sea level)	850 ft. per min.
Service ceiling	17,000 feet
Absolute ceiling	18,400 feet

THE ARADO ACE OF CLUBS

By

Edwin P. A. Heinze



Side view of the Arado, a new type 2-place light plane

THE Arado company of Warnemunde in Germany recently introduced a two-place light plane in which the seats are arranged side by side. This plane has a high speed of 100 miles per hour and is designed for private and instruction flying, for which latter purpose it is especially adapted because its seating arrangement gives the instructor an excellent opportunity to observe the student's work and correct his mistakes.

The machine is a cantilever monoplane of the parasol type. It has a windshield of such generous size as to comprise practically a weather-proof cabin. The only openings are at the sides above the door. A flap of cellon hinged to the front cabane strut at each side gives additional protection. This ship represents the first German venture in the construction of a small light cabin plane with two seats abreast, and it is finding great favor in Germany despite its price of approximately $4,000.

The wing is built up of wood and has two spars. From the leading edge to the rear spar it is covered with plywood, the remainder of the wing being covered with linen. The wing shape is trapeziform with rounded-off tips. The ailerons are entirely of wood. At the center, the wing section has a thickness of 10.8 inches. It tapers off to 3.5 inches at the tips, where mooring rings are provided. The section has a slight camber on the lower surface.

The fuselage structure consists of a framework of steel tubes. The framework is lined with linen and integral with it at the rear is the fin, which likewise is made of steel tubes welded on top of the tail part. The fore part and engine cowling are of aluminum. The lifting surface of the wing (exclusive of the part forming the roof of the cabin) has an area of 172.2 square feet.

The landing gear is of the split axle type incorporating a rubber shock absorber strut leading to the upper longeron of the fuselage. The rubber rings in the shock absorber can easily be removed or added to. A similar arrangement has been provided for the tail skid.

A special feature of this plane is that it is the first one to be equipped with a new inverted four-cylinder engine made by the Argus works of Germany. This engine develops 80 horsepower. It has a relatively small power output for its size because the prime consideration in its design is to achieve reliability and longevity. Its maximum speed is given at 1,400 r.p.m.

The eighty-horsepower inverted Argus engine is known as the As. 8. It has a bore of 4.75 inches and a stroke of 5.5 inches. The compression ratio is 5.3 to 1. At its normal output of eighty horsepower, fuel is consumed at the rate of .296 lb. per horsepower per hour, and oil at .0176 lb. per horsepower per hour.

With this motor installed the front part of the machine permits good vision for the pilot and passenger. The aluminum engine cowling is provided with hinged flaps providing access to the motor.

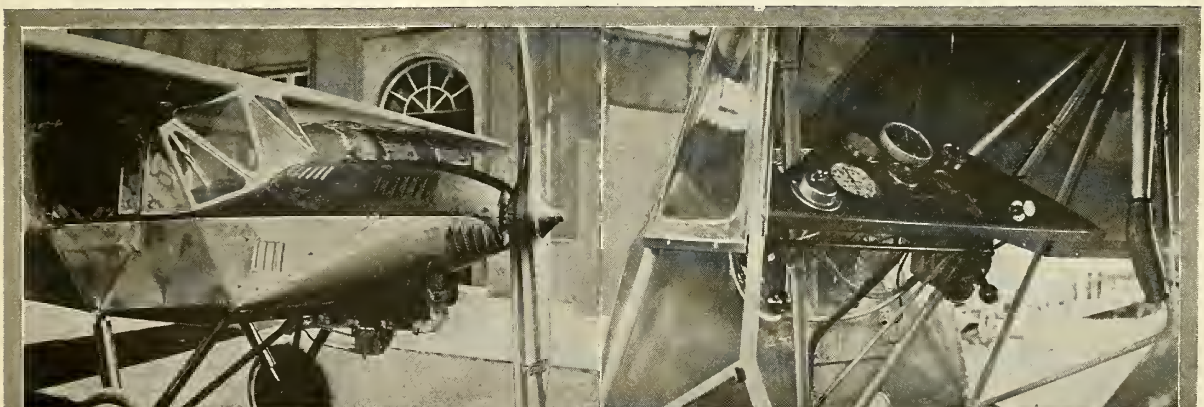
The control stick for the elevators and ailerons is installed in an inverted position, hanging down from the roof of the cabin. It is forked so that one prong hangs down in front of each seat. One of the prongs can be removed. The advantage claimed for this arrangement is that it eliminates the necessity of using long control cables. The cables for the elevators run through apertures in the upper part of the wing to the tail. The stabilizer and elevators are supported by lateral struts and are located above the fin, on a plane several inches above that of the wing. The rudder is controlled in the usual manner by rudder bars in front of the seats. The two bars in the cabin are coupled and consist of steel rods.

The cabin is very comfortable and the motor noise does not appear to be so pronounced as in other machines of this class, probably because with the inverted engine the valve noise is carried away beneath the plane. A large instrument board is provided in front of the seats. Two glass covered openings in the floor permit the pilot to see the ground without leaning out.

A luggage compartment is provided behind the seats, separated from the cabin proper by a fabric partition with two rip seams. Two fuel tanks, each holding 14.5 gallons, are located in the wing to the right and left of the cabin.

Specifications

Span	34 feet 5 inches
Length	22 feet 7 inches
Wing area	172.2 square feet
Weight empty	893 pounds
Disposable load	693 pounds
Passengers and baggage	529 pounds
Fuel load	154 pounds
Oil load	22 pounds
Gross weight loaded	1,586 pounds
Wing loading	9.2 pounds per square foot
Power loading	19.8 pounds per horsepower
High speed	100 miles per hour
Climb in 8 minutes	3,280 feet

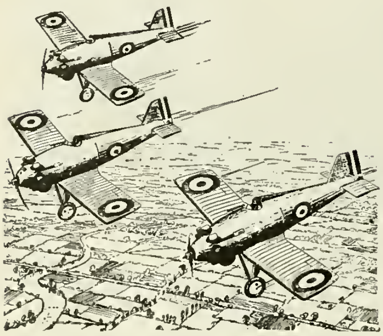


The German Arado monoplane equipped with an inverted 4-cylinder Argus 80-horsepower engine

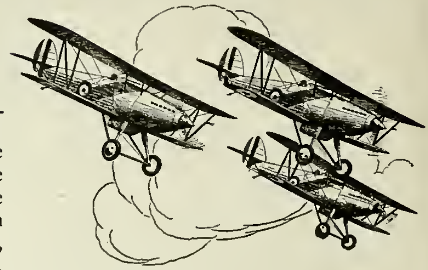
BRITISH FIGHTING AIRPLANES

(Part Two)

Paul E. Lamarche



Vickers Interceptors



Hawker "Hornets"

IN the November issue, the first portion of this article dealt with a general discussion of the types of fighting aircraft in use by the Air Force of Great Britain. Armstrong-Whitworth, Bristol and Boulton & Paul planes were described in detail. This part of the article gives descriptions of the single-seater fighters produced by seven more of Great Britain's leading constructors of military aircraft.

GLOSTER

The Gloster Aircraft Company, Ltd., of Cheltenham, established in 1915, is well known for its planes of steel construction. Gloster has produced a number of successful fighting planes, the most recent of which are the Gloster "Gamecock II" and the Type SS.18. The Gamecock, which is the older plane, is generally powered by the Bristol Jupiter Series VI engine. The SS.18, the latest Gloster single-seater fighter, is a high performance biplane which has attained a maximum speed of 205 miles per hour at an altitude of 10,000 feet with the Bristol Jupiter Series VII powerplant.

Gloster Gamecock

The Gamecock is a biplane with the upper wing of high lift section and the lower of medium lift. The wings have a total area of 263 square feet and are of unequal span. The upper wing is in two sections joined to a center section, which is carried on steel tubular struts. The wings are braced on either side of the fuselage by a set of interplane struts. Ailerons are fitted to both the upper and lower wings. The wings are of all-steel construction, fabric covered, with two main spars and a normal number of ribs.

The fuselage is short and very deep around the cockpit which is placed under the cut-out in the top plane. The structure is of high tensile steel longerons and steel bracing members and is oval in section. The forward part is metal covered and the tail section fabric covered. The empennage is of the monoplane type with a balanced rudder. There is also a small fin beneath the fuselage. The structures of the tail elements are steel frames with fabric covering.

Fuel is carried in two 26-gallon tanks mounted in the upper wing, giving a gravity feed. Oil is carried in a 5½-gallon tank in the fuselage. The landing gear is of the cross-axle V type of Gloster patent. The military equipment includes two Vickers guns at the sides of the fuselage firing through the propeller, and there is also provision for racks to carry four 20-pound bombs.

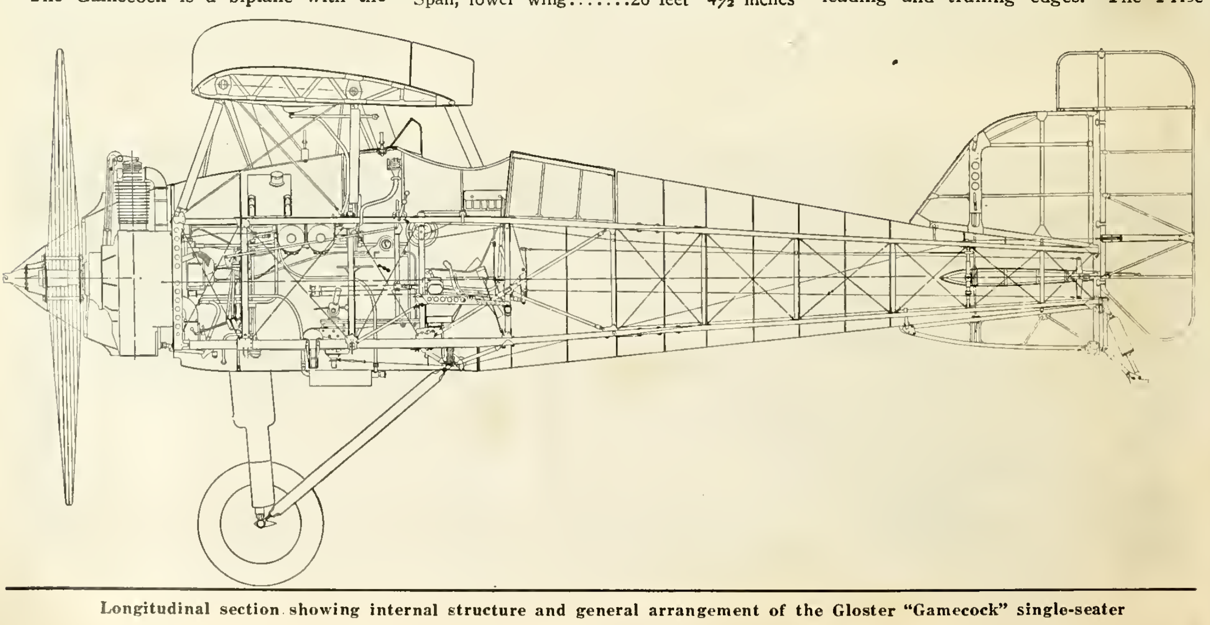
Specifications

(With Bristol Jupiter Series VI engine)

Span, upper wing	30 feet 1 inch
Span, lower wing	26 feet 4½ inches
Chord, upper	5 feet 3 inches
Chord, lower	5 feet 2½ inches
Gap	4 feet 10 inches
Total loaded weight	2,820 pounds
Wing loading	11 pounds per square foot
Power loading	5.56 pounds per horsepower
Fuel capacity	52 gallons
Oil capacity	5½ gallons
Speed at 5,000 feet	155 miles per hour
Speed at 10,000 feet	152 miles per hour
Landing speed	49 miles per hour
Climb to 15,000 feet	11½ minutes
Climb to 20,000 feet	20 minutes
Absolute ceiling	25,500 feet
Endurance	2½ hours

Gloster SS.18

The Gloster SS.18 is a high performance single-seater fighter of the two-bay biplane type. The wings have two main spars of high tensile steel with steel ribs. In the design of the wing structure of this plane, special care was taken to enclose all wire bracing, wire fork ends and strut ends inside the fabric line. The fabric covering is fixed to the wing ribs by the Gloster wired-on method: i. e., the fabric is placed in position with a layer of tape, and wire is threaded through eyelets formed in the rib and locked under the head of the bolts attaching the leading and trailing edges. The Frise



Longitudinal section showing internal structure and general arrangement of the Gloster "Gamecock" single-seater

type ailerons, which are on both upper and lower wings, are arranged so that no levers project beyond the fabric covering.

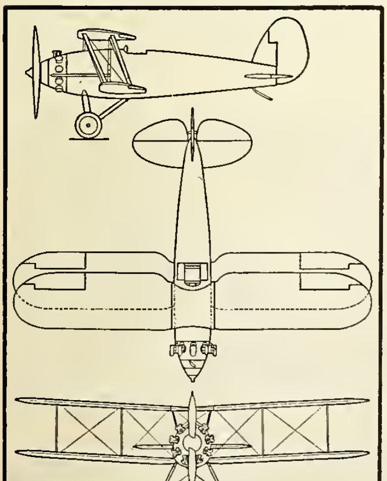
The fuselage is in three sections, the front section forming the engine mount, the middle section containing the cockpit together with the fuel and oil tanks, and the rear portion forming the tail unit. The middle portion has square steel tube longerons and simple plate fittings, and the rear section is built up with round tubing and joints of the standard Gloster pressed plate type, together with the usual cross bracing. Light metal hoops attached to the longerons give the well streamlined fuselage an oval section. The forward part of the fuselage as far back as the cockpit has a metal covering. The rear section is covered by fabric. The empennage is of the normal monoplane type with an adjustable stabilizer and balanced rudder. In the cockpit the rudder bar is one complete unit fitted with a wheel and thread adjustment by which it can be adjusted by the pilot during flight. The landing gear is a Gloster patented cross-axle V type of wide track. Equipment includes wheel brakes which can be operated either by pedals on the rudder bar or from the control stick.

The military load of the Gloster SS.18 includes a parachute, oxygen tank, electrical equipment and the usual armament of two Vickers guns with 1,200 rounds of ammunition. Provision for radio apparatus is also made.

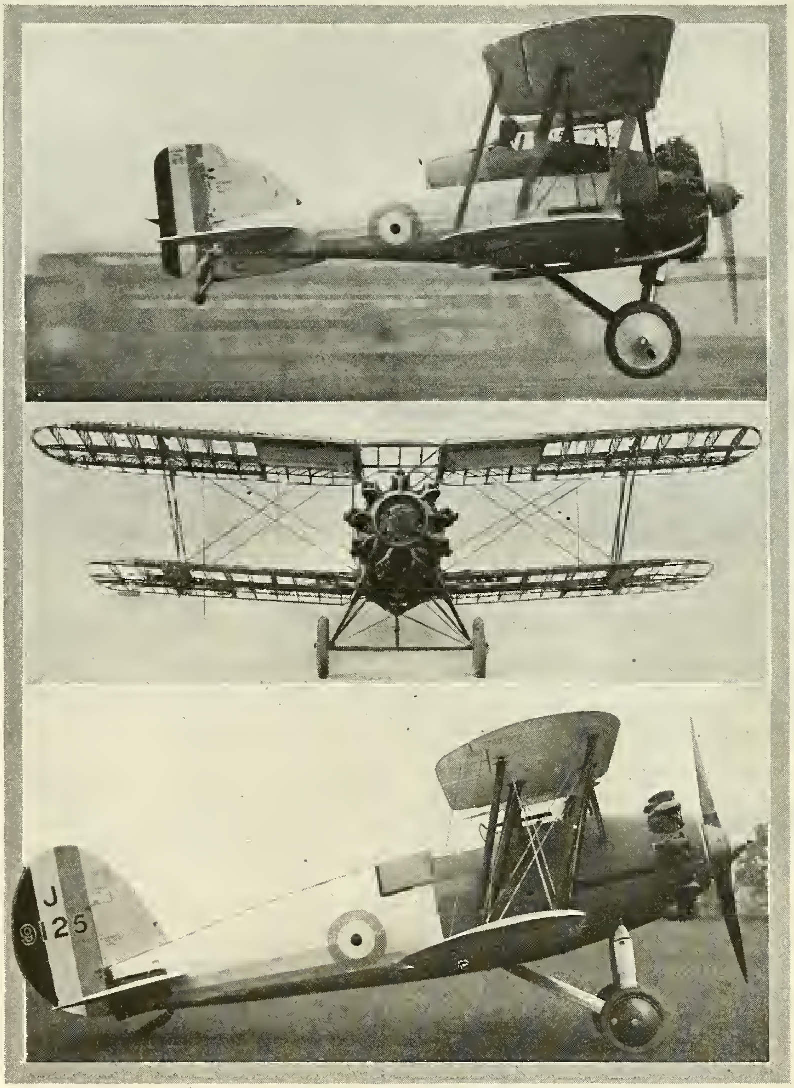
Specifications

(*With Bristol Jupiter Series VII engine*)

Span	32 feet 9½ inches
Height	11 feet
Length	25 feet 9 inches
Chord	5 feet 3 inches
Wing area	300 square feet
Aileron area	32 square feet
Wing section	R.A.F. 28
Total weight loaded	3,300 pounds
Wing loading	11 pounds per square foot
Power loading	7.3 pounds per horsepower
Fuel capacity	62 gallons
Oil capacity	7 gallons
Speed at 3,280 feet	178 miles per hour
Speed at 9,840 feet	200 miles per hour
Speed at 19,700 feet	195 miles per hour
Maximum speed at 10,000 feet	205 m. p. h.
Stalling speed	60 miles per hour
Climb to 9,840 feet	5½ minutes
Climb to 19,700 feet	13½ minutes



Gloster Fighter SS.18 with Bristol engine



Gloster Fighters. Upper views, "Gamecock;" bottom view, the SS. 18

HAWKER

The H. G. Hawker Engineering Company, Ltd., of Kingston-on-Thames, is the successor to the famous Sopwith company. It specializes in the design and construction of all-metal military aircraft. Hawker has produced a number of successful fighters and fast day bombers, as well as having developed types for naval service. The Hawker "Hawfinch" is a single-seater fighting plane fitted with the Bristol Jupiter Series VII, and the Hawker Hornet (Fury) is the company's most recently developed single-seater interceptor fighter. This new plane, which is built around the Rolls-Royce F engine, has very clean lines and is said to be the fastest plane in the world designed for its function. At present, however, performance information remains an Air Ministry secret and I am able to give only a brief description of this interesting new war plane.

Hawker Hawfinch

The Hawfinch is a single-seater two-bay biplane of all-metal construction. The upper wing is built up in two sections which are joined to a center section carried above the fuselage by four tubular steel struts. The wings are built up with tubular steel spars and duralumin ribs, covered with fabric. The spars consist of two one-piece booms which are interconnected by a web, the assembly being riveted. The ribs are of duralumin tubing of simple section. Ailerons, on the top planes only, are fitted with flap gear.

The fuselage has a rectangular section with an arched top. It is built up of longerons of round steel tubing and round duralumin tube struts which are flattened at their extremities and joined to connecting members by flat plates and tubular rivets. The forward part of the

(*Continued on following page*)

Hawker Fighters: Upper view, "Hawfinch;" lower, the Rolls-Royce-powered "Hornet"

fuselage has a metal covering, and the aft part is fabric covered. The pilot's cockpit, placed under the cut-out in the upper wing, contains a seat which has a four-inch vertical adjustment. The armament consists of two Vickers guns firing through the propeller and bomb racks for four 20-pound bombs.

The empennage is of normal monoplane type with unbalanced surfaces. The landing gear is of the cross-axle V type. Fuel is carried in a 54-gallon fuselage tank which feeds the Jupiter motor by gravity; oil is carried in a 4½-gallon tank in the fuselage which is protected by the fire-proof bulkhead.

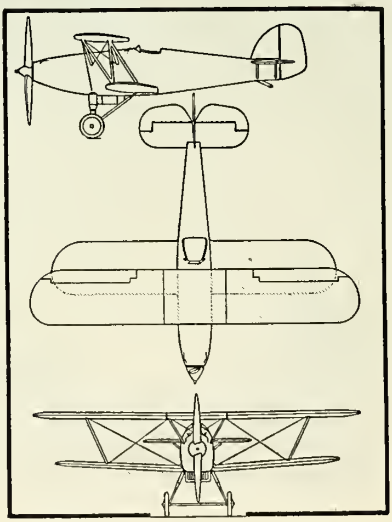
Specifications

(*With Bristol Jupiter Series VII engine*)

Span	33 feet 6 inches
Length	24 feet 4 inches
Height	9 feet 6 inches
Wing area	294.5 square feet
Fuel capacity	52 gallons
Oil capacity	4½ gallons
Speed at 9,840 feet	171 miles per hour
Speed at 14,760 feet	167 miles per hour
Speed at 19,680 feet	165 miles per hour
Initial climb	1,164 feet per minute
Climb to 9,840 feet	4 minutes 7 seconds
Climb to 14,760 feet	7 minutes 3 seconds
Climb to 19,680 feet	11 minutes 8 seconds
Climb to 24,600 feet	16 minutes 4 seconds
Service ceiling	29,850 feet
Absolute ceiling	30,500 feet

Hawker Hornet (Fury)

The Hornet, which has been renamed Fury, is a high performance interceptor fighter with biplane wings of unequal span. They are of the staggered single-bay type. The upper wing is supported by four splayed out tubular struts and is fitted with ailerons. The wings are of metal construction with a fabric covering and are externally braced by interplane N-struts and bracing wires. The fuselage has a metal structure, rectangular in form with an arched top. The forward part as far back as the cockpit has a light metal covering, and the tail section is covered with fabric. The supercharged Rolls-Royce F water-cooled engine is



Rolls-Royce-powered Hawker "Hornet"

neatly faired in, and the whole of the fuselage presents very clean lines. The cockpit is set back from under the trailing edge of the top plane and is well arranged to provide the best possible visibility. The radiator is carried underneath the fuselage between the legs of the cross-axle V type landing gear. The empennage is of the monoplane type with balanced elevator flaps. The Hornet (Fury) has an armament of two Vickers guns firing through the propeller.

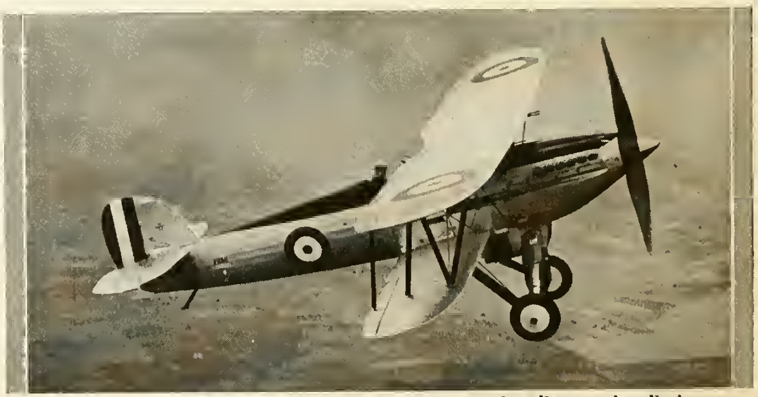
Specifications and performance information on the Hawker Hornet interceptor fighter powered with Rolls-Royce F motor are not available.

FAIREY

Fairey Firefly II

Another new high performance interceptor fighter is the Fairey Firefly II, which is built around the Rolls-Royce F engine. This fast new fighting plane is built by the Fairey Aviation Company, Ltd., of Hayes, in Middlesex, which is a well-known firm specializing in the production of high performance military aircraft. The company was founded in 1916 by Mr. C. B. Fairey, M.B.E., the managing director. The performances of the Firefly are as yet a military secret and only a brief description is at present available. In general appearance this new plane is a beautiful job with its well-streamlined fuselage and staggered biplane wings. It was built to combat fast day bombers and pursuit planes and makes its best performances at altitudes around 20,000 feet. Structurally, the Firefly is a metal structure biplane with wings of unequal span and chord, the upper having the larger area. The wings are covered with fabric and are externally braced by interplane N-struts and the usual cross bracing wires. The high aspect ratio ailerons on both wings have a metal spar between the upper and lower wing flaps.

The fuselage has a rectangular frame which is faired to an oval section. The forward part is covered by an easily detachable metal cowling; the tail section is covered with fabric. The cockpit is placed slightly aft of the cut-out in the top plane and directly over the trailing edge of the lower wing. This arrangement affords the pilot good visibility in all directions. The armament is the standard two Vickers machine guns firing through the propeller. They are carried on each side of the fuselage and fire along streamlined troughs in the cowling.



The Fairey "Firefly," an interceptor having exceptionally speedy climb

The empennage is of the normal monoplane type with a tabilizer adjustable in flight. The rudder and elevator flaps are balanced. The landing gear, of the cross-axle type, is fitted with a special shock absorber strut and pneumatic wheel brakes. The Rolls-Royce F engine is fitted with a retractable radiator carried under the fuselage. Fuel is carried in two wing tanks which give the motor a gravity feed.

(With Rolls-Royce F water-cooled engine)

Span	32 feet
Chord, upper wing	5 feet 1½ inches
Chord, lower wing	4 feet 1 inch
Length overall	24 feet 6 inches
Height overall	8 feet 8 inches

Performance information not available.

BLACKBURN

Blackburn Lincock

The Blackburn Lincock is an interesting little pursuit plane of less power than others described in this article, though it puts up a very creditable performance for its size and power. Built by the Blackburn Aeroplane and Motor Company, of Brough, in East Yorkshire, it was designed primarily as an advanced training plane and a single-seater fighter. The Blackburn concern was founded in 1914 at Leeds by Mr. Robert Blackburn, the managing director. It is well known for its successful military and naval planes and is represented in America by the Detroit Aircraft Corporation.

The Blackburn Lincock is a light single-bay biplane of all-metal construction which is normally powered by the Armstrong-Siddeley Lynx engine, though other motors of equivalent power may be used. The Lynx is a seven-cylinder air-cooled engine rated at 215 horsepower at 1,900 revolutions per minute with a maximum power output of 235 horsepower at 2,090 revolutions per minute. Its dry weight is 513 pounds.

The wings of the Lincock are built up with high tensile steel spars and ribs of duralumin, covered with fabric. The upper wing is in one piece, and the lower wing is in two pieces joined under the fuselage at the apex of a V structure of steel tubes. The lower wings have dihedral. Ailerons are fitted to both upper and lower.

The fuselage, which is well streamlined, is built up in three sections, the engine section, the middle section (which includes the cockpit) and the tail section. Its structure is composed of steel tube longerons and vertical and horizontal struts. With the exception of that around the fuel tank, there is no wire bracing in the fuselage. The intersecting members are joined by steel gusset plates which are held by tubular struts. The fuselage has a duralumin covering in detachable sections extending as far back as the cockpit, after which the covering is fabric. The cockpit, under the cut-out in the top plane, contains an adjustable seat designed for a parachute. The empennage is of the monoplane type, the elements of which are built up with steel

Blackburn "Lincock" at the Chicago Air Races. *(Photo by U. S. Army Air Corps)*

tubular spars and duralumin ribs. The landing gear is of the cross-axle V type. Fuel is carried in two tanks which have a total capacity of 35 gallons and the engine is fed by gravity. The armament is the standard two Vickers guns firing through the propeller.

Specifications

(With Armstrong-Siddeley Lynx engine)

Span	22 feet 6 inches
Length	19 feet 6 inches
Height	7 feet 10 inches
Chord	4 feet
Wing area	170 square feet
Weight empty	1,435 pounds
Disposable load	645 pounds
Total weight	2,080 pounds
High speed (ground level)	150 miles per hour
High speed at 10,000 feet	142.5 miles per hour
Cruising speed	130 miles per hour
Landing speed	60 miles per hour
Wing loading	11.3 pounds per square foot
Power loading	8.9 pounds per horsepower
Initial climb	1,450 feet per minute
Service ceiling	20,000 feet
Absolute ceiling	22,000 feet
Range	390 miles

WESTLAND

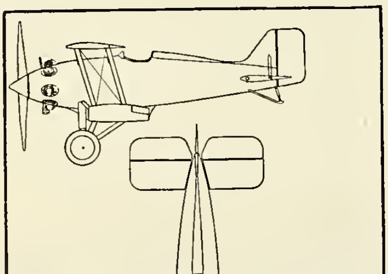
Westland Wizard II

The Westland Wizard II, a parasol wing monoplane fitted with the Rolls-Royce F supercharged engine, is a single-seater fighter of high performance. It is built in Yeovil by the Westland Aircraft Works, a branch of Petters, Ltd.

The wing of the Westland Wizard is built up in two sections attached to a center section which is carried over the fuselage by four struts. It is braced by a pair of oblique tubular struts on either side of the fuselage which extend from the mid-sections of the wing to the lower fuselage spars and which in turn are braced by diagonals and cross members. The wing section is the R.A.F. 34. It has an all-metal structure with fabric covering. The outer sections effect a two-degree dihedral, and the total wing area is 234 square feet. The inset ailerons are of the Frise type and are balanced.

The fuselage is of oval section of small dimensions. The pilot's visibility is good in all directions, the wing being carried slightly above the eye level of the pilot and the cut-out in the center section over the cockpit being very wide. The fuselage is in two sections, the forward of which is built up with square steel and duralumin tubing, steel being used on the more heavily stressed parts. In the rear part of the fuselage aft of the cockpit, the structural members are of round duralumin tubing. The forward section is rigidly braced; the tail section is braced by swaged rods. The forward part of the fuselage has a metal covering reaching as far back as the cockpit, after which it is fabric covered. The empennage is the normal monoplane type with a balanced rudder and stabilizer which is adjustable by a hand wheel in the cockpit. The landing gear is of the cross-axle type with telescopic legs to which are fitted the Westland medium pressure oleo-pneumatic gear.

The military loading of the Wizard consists of the standard two Vickers guns firing through the propeller. These guns are carried at the sides of the fuselage in streamline troughs in the cowling. There is also wireless equipment and oxygen apparatus. Fuel is carried in the center section of the wing in a 27-gallon tank as well as in a 28-gallon fuselage tank. A four-gallon oil tank is carried in the forward part of the fuselage. A retractable radiator, which is fitted under the fuselage behind the landing gear, is



Blackburn "Lincock" with Lynx engine

(Continued on following page)

equipped with a special arrangement whereby it can be raised into or let down out of the fuselage by means of a handle in the pilot's cockpit. The pilot's seat has a four-inch adjustment.

Specifications

(With Rolls-Royce F water-cooled engine)

Span	40 feet
Chord	6 feet 6 inches
Incidence	3 degrees
Dihedral	2 degrees
Wing section	R.A.F. 34
Length overall	26 feet 10⅝ inches
Height	9 feet 4 inches
Track of landing gear	5 feet 6 inches
Wing area	234 square feet
Aileron area	26 square feet

DE HAVILLAND

D.H. 77 INTERCEPTOR FIGHTER

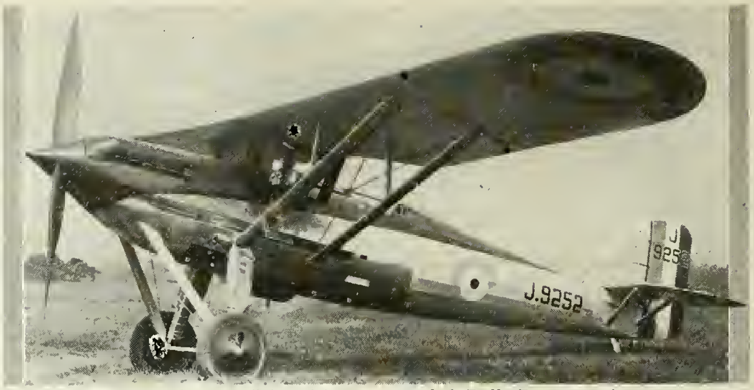
The new low-wing monoplane interceptor fighter built by the DeHavilland Aircraft Company, Ltd., is one of the most interesting of recent fighting planes built in England. Known as the D.H. 77, it is somewhat revolutionary in design and is at present being tested for possible service adoption. It is the first plane to be fitted with the new Halford-designed Napier air-cooled engine in H form, which was described in the first part of this article. Information concerning both the plane and its engine is very limited, since the British Air Ministry has not as yet granted permission to the constructors to divulge full particulars. Such details, however, as have been made known I am able to present in this brief description.

This new interceptor plane has a braced low wing of wood and metal construction which is fitted with ailerons of the D.H. patent differential control system. The fuselage has a structure of duralumin tube with wooden formers, and is fabric covered with the exception of the forward part which has a light metal covering. The landing gear is of the divided type with an exceptionally wide track. It uses the rubber in compression system. Although no performance information is available, an unconfirmed rumor indicates that this plane has a speed of 203 miles per hour at 20,000 feet.

Specifications

(With Halford-Napier H air-cooled engine)

Span	32 feet 2 inches
Length	24 feet 6 inches
Height	7 feet 6 inches
Total weight loaded	2,300 pounds

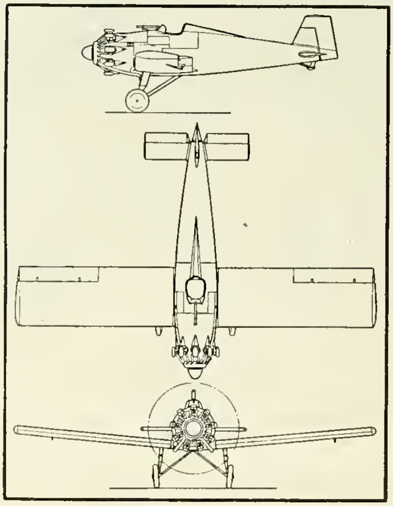


Westland "Wizard" II with water-cooled Rolls-Royce engine

VICKERS

VICKERS TYPE 151 INTERCEPTOR FIGHTER

Vickers (Aviation), Ltd., located at Weybridge, is well known as the producer of many types of planes for both military and civil use. The newest Vickers pursuit plane, which was exhibited at the London Aero Show at Olympia



Vickers Type 151 with Bristol engine

in the summer of 1929, is a very interesting low-wing monoplane built after the Vickers-Wibault method of construction. Designed as a high performance single-seater interceptor fighter, it is powered by the Bristol Mercury IIA air-cooled engine and is known as the Vickers Type 151. Performance data are still unavailable and little detailed information on its construction has been divulged by the Air Ministry.

However, this much is known. Its construction is nearly entirely of duralumin even to the covering of the wing which has a covering of duralumin sheet which is attached to the internal wing structure of the same alloy by the patented Vickers-Wibault process. The wing, of cantilever construction, is built up with two outer sections attached to wing roots built integral with the fuselage. The ailerons are of the Frise type actuated by push and pull rods. The metal fuselage has an oval form and is metal covered as far aft as the cockpit, after which fabric covering is used. The cockpit is placed above the trailing edge of the wing and is equipped with a streamlined headrest.

Specifications

(With Bristol Mercury engine)

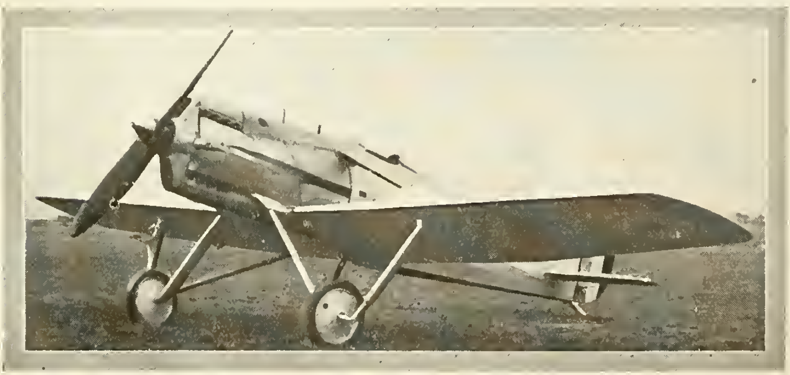
Span	32 feet 6 inches
Length	23 feet
Wing area	150 square feet

No performance information available.

THE ROLLS-ROYCE "F" TYPE ENGINE

THE Rolls-Royce "F" type series of engines includes four models, the F-XIA, F-XIB, F-XIIA and F-XIIB, differing only in regard to the gear ratio and compression ratio. The F-XI engines have a gear ratio of .632:1 and the F-XII a gear ratio of .552:1. The letters A and B indicate compression ratios of 6:1 and 7:1 respectively. In all cases the bore and stroke are 5 inches by 5½ inches, the normal crankshaft speed 2,250 and the maximum speed 2,500 r.p.m. With the .632:1 gear ratio the normal airscrew speed is 1,421 r.p.m. and with the .522:1 gear ratio, 1,244 r.p.m.

The normal brake horsepower developed at ground level by the engines with a 6:1 compression ratio is 490, and with the 7:1 ratio 480, and the fuel consumption for these two types is 30 gals. and 28.25 gals. respectively. In the high-compression engines the ratio h.p. of 480 is developed at normal speed on the ground and this power is maintained up to a height of 3,000 feet.

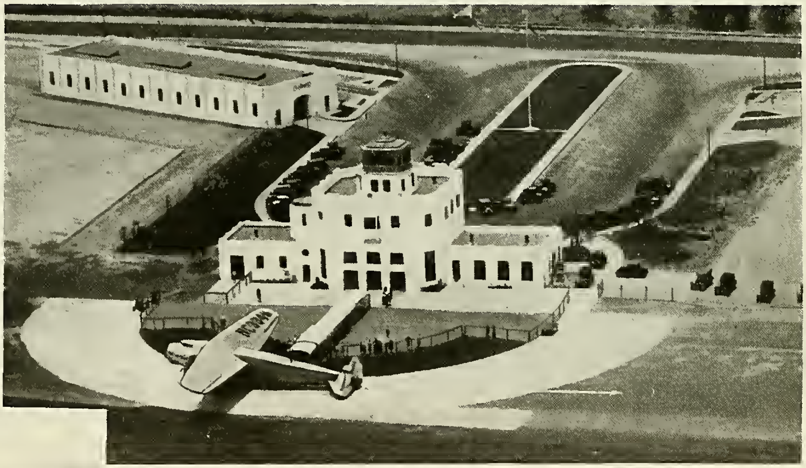


DeHavilland 77 low-wing interceptor with Halford-Napier engine

HARRIS M. HANSHUE
President
Transcontinental and Western Air Inc.
Los Angeles, California

America's Greatest Aircraft Market
Los Angeles County

Terminal . . Transcontinental and Western Air Express adjoining Alhambra near Los Angeles



Administration Building at 243 acre United Airport, Burbank, California — near Los Angeles.

Grand Central Air Terminal Administration Building, Glendale, Calif. — near Los Angeles.

"ANY MANUFACTURER of aircraft or of equipment essential to the aviation industry has but to analyze the records of the various air transport companies of America to discover that his greatest potential (if not present-day) market is in Los Angeles County.

"The five air transport companies whose lines emanate from Los Angeles County operate twelve outgoing and incoming daily schedules serving—either directly or by direct connection—every section of the United States and Canada and important centers of Mexico, Central and South America, Cuba and West Indies.

"Interest in air travel here is particularly strong, flying conditions are good the year 'round, and manufacturing costs are lower than elsewhere.

"These conditions, plus the fact that five major air transport companies have their Western terminals in Los Angeles, obviously, make this the logical location for the profitable operation of the aircraft industry."

Harris M. Hanshue
President Transcontinental and Western Air Inc.

LOS ANGELES COUNTY

Flying All Year

Complete information including detailed surveys supplied on request by Industrial Department Los Angeles Chamber of Commerce

ITALIAN HELICOPTER

ALTHOUGH the helicopter has long been the object of study and experiment, attempts at flight with this type of aircraft have been anything but satisfactory. The helicopter preceded the airplane in the search for a solution to the problems of flying; it is recalled that Leonardo da Vinci designed the first helicopter. At the beginning of the last century, the Englishman Cayley succeeded in producing a model which lifted itself. Up to the time of the Italian engineer Forlanini, however, helicopters were but models, the motive power usually being furnished by rubber strands. In 1887, Forlanini, after six years of study and experiment, constructed a helicopter operated by a steam engine, which succeeded in climbing 13 meters from the ground. After Forlanini, other inventors and constructors all over the world have tried to solve the problem of the helicopter without material success.

True, a few of these machines have been able to rise from the ground, but the heights they have reached, the distances traveled and the durations attained have been inconsequential in terms of practical significance. Nevertheless, because the helicopter, if satisfactorily developed, would afford several important advantages, efforts in this direction have not ceased and designers throughout the world continue work on machines utilizing the helicopter principles of flight.

One of the most interesting and promising machines recently built is the new d'Ascanio helicopter constructed in Italy. This helicopter has established three international records for endurance, distance and altitude for aircraft of its type. In recent tests the machine established the following records: For distance in a straight line, by traveling 3,284 feet in five minutes, 12½ seconds; for endurance by remaining in the air for eight minutes, 45 1-5 seconds; and for altitude by attaining the height of 54 feet in one minute, 40 1-5 seconds.

The machine is still in the experimental stage and the progress made thus far is primarily of scientific value. For many years, Dr. d'Ascanio, with the assistance of Gr. Uff. Baron Pietro Trojini, has studied and experimented with the construction of the new helicopter.

The d'Ascanio helicopter attempts to obtain lifting power by rotating one or more propellers on a vertical axle operated by a standard aviation engine.

The machine is composed of a fuselage surmounted by two large propellers rotating in opposite directions. The blades of these propellers form a kind of small airplane provided with tail and horizontal rudder; they are free to assume automatically the fundamental incidence determined by the tail. In operating the small horizontal rudders, the incidence may be varied in order to accomplish the climbing and diving control of the aircraft. This system is advantageous in that the propellers may work as a parachute or autogiro in case of engine failure.

For horizontal movement, the aircraft is inclined toward the desired direction; this is done by controlling the pitch of auxiliary small propellers located on the tail and at both sides of the fuselage.

The aircraft is a single-seater weighing about 800 kilograms, and is equipped with a 95-horsepower A-50-S engine.

Piloted by Major Marinello Nelli, the helicopter made several flights over Ciampino Nord Field. According to the agreed tests, the aircraft took off and landed in a space measuring only 15 meters in diameter, remained stationary at an altitude of more than four meters for a period of time almost twice as long as required by the contract, and landed when a pre-arranged signal from the ground was given. Later it performed a closed course flight of one mile.

It has performed other demonstration flights inside of a dirigible hangar. Notwithstanding the disturbances caused by eddies existing in the hangar, the aircraft performed evolutions in all directions, remaining in the air for several minutes.

During some of the tests the pilot released the controls and the aircraft still remained stable.

The first helicopter has demonstrated the soundness of its principles. The next model will be built in accordance with the information learned from the present machine, in order to produce a machine of practical utility.

H-T SPARK PLUG

A NEW spark plug will shortly be put on the market by the Hurley-Townsend Corporation, New York. This company has recently been incorporated to manufacture and distribute this new product to the aviation industry.

The new H-T "copper-cooled' 'spark plug was designed to circumvent the dangers of both pre-ignition and fouling. Use is made of the fact that copper conducts heat ten times as fast as steel—the large center electrode is surrounded by a copper tube which conducts the heat away from the nose of the plug, allowing higher compression to be used without unduly shortening the length of the nose. Laminated mica insulation is used and absolute compression tightness is obtained, because the copper tubing around the center electrode is expanded and thus forced firmly against the mica during manufacture.

The plug was designed by Roy T. Hurley, formerly general manager of the B-G Corporation (makers of spark plugs) and later of the Moto Meter Company (makers of Boyce Moto Meters). George H. Townsend, president of the Hurley-Townsend Corporation, was president of the Motor Meter Company from its inception in 1912 until a year ago, when he sold out his interests.

RECENT AIRCRAFT PATENTS

THE following patents of interest to readers of AERO DIGEST were recently issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering:

Aeroplane. Emil Just, New York, N. Y. (No. 1,773,361)

Aeroplane-wing. Paul Mueller, Chicago, Ill. (No. 1,773,432)

Aeroplane propeller and governor. Haim M. Perez, Newport Beach, Calif. (No. 1,-773,434)

Airplane construction. Anthony H. G. Fokker, Amsterdam, Netherlands; assignor to Atlantic Aircraft Corporation (No. 1,-773,481)

Mechanism for operating aeroplane-brakes and similar structures. George H. Davis, Richmond, Va. (No. 1,773,521)

Expanding wing for aeroplanes. Mark O. Hannah, Granby, Mo. (No. 1,773, 530)

Motor arrangement for aircraft. Claude Dornier, Friedrichshafen, Germany; assignor of one-half to Dornier-Metallbauten G. m. b. H., Friedrichshafen, Germany. (No. 1,-773,615)

Aeroplane. George O. Kinicke, Dunellen, N. J. (No. 1,733,625)

Shelter or shed for aircraft. Franciszek Wasilkowski, Lwow, Poland. (No. 1,773,-656)

Aeroplane. Alexander G. Taflan, Detroit, Mich. (No. 1,773,889)

Flying apparatus. Claudiaus F. McKinney, Rochester, N. Y. (No. 1,773,921)

Apparatus for home flying instructions. Albert J. Bertram, Miami, Fla. (No. 1,773,-936)

Launching or landing apparatus. Robert S. Haight, West Islip, N. Y. (No. 1,773,-999)

Aeronautical power plant. Roy M. Hall, Buffalo, N. Y. (No. 1,774,016)

Controlling device for aeroplanes and similar aircraft. Marcel Lobelle, Hayes, England. (No. 1,774,024)

Retractable landing-gear for aircraft. Albert W. Mooney and Lewis H. Height, Colorado Springs, Colo.; assignors to Alexander Industries, Inc., Colorado Springs. (No. 1,774,032)

Aeroplane-brake. John M. Light, Annville, Pa. (No. 1,774,063)

Aviator's helmet. Henry R. Hart, Montclair, N. J.; assignor to A. G. Spalding & Bros., New York, N. Y. (No. 1,774,325)

Aircraft. Chance M. Vought, Grenwolde, Great Neck, N. Y. (No. 1,774,342)

Flying-machine. William Roescher, Pittsburgh, Pa. (No. 1,774,404)

Aeroplane. Louis Bleriot, Paris, France. (No. 1,774,414)

Airplane. Vincent J. Burnelli, New York, N. Y.; assignor to Uppercu-Burnelli Corporation, New York. (No. 1,774,470)

Means for launching torpedoes from single-pontoon seaplanes. Vincent J. Burnelli, New York, N. Y.; assignor to Uppercu-Burnelli Corporation. (No. 1,774,471)

Cooling means for airplane-engines. Vincent J. Burnelli, New York, N. Y.; assignor to Uppercu-Burnelli Corporation. (No. 1,-774,472)

Airplane-empennage construction. Vincent J. Burnelli, New York, N. Y.; assignor to Uppercu-Burnelli Corporation. (No. 1,774,-473)

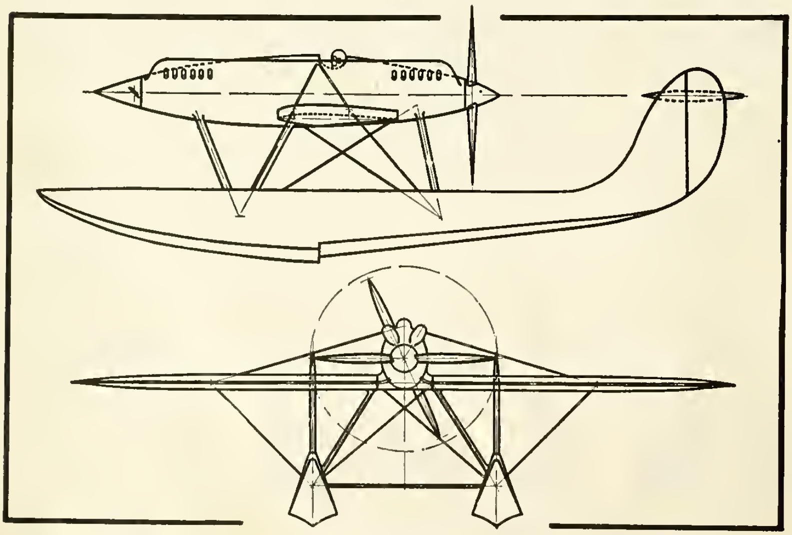
Airfoil control means. Vincent J. Burnelli, New York, N. Y.; assignor to Uppercu-Burnelli Corporation. (No. 1,774,-474)

Wing for aircraft. James B. Anderson, Oakland, Calif. (1,777,279).

Parachute. Herbert E. Hawes, Milwaukee, Wis. (1,777,363).

Airplane hangar. Robert L. Mills, Greenport, N. Y. (1,777,376).

Helicopter aeroplane. Jakob Hojnowski, Nekoosa, Wis. (1,777,492).



Outlines of an interesting Dornier racing seaplane design employing tandem engines

Aircraft safety device. George F. Myers, Jackson Heights, N. Y. (1,777,528).

Aeroplane. Clarence G. Freeman, Lindsay, Calif. (1,777,557).

Buoyant airplane. Frederick Ries, Compton, Calif. (1,777,576).

Airplane. Ralph H. Upson, Grosse Ile, Mich. (1,777,593).

Means for propelling air and water craft. William Potts, Newcastle-on-Tyne, England. (1,777,652).

Flying-machine. Walter Rieseler and Walter Kreiser, Berlin-Johannisthal, Germany; assignors to E. Burke Wilford, Merion, Pa. (1,777,678).

Parachute deater. Frederick D. Warner, Middletown, N. Y. (1,777,685).

Airplane cycle. Joseph Biagi, Chicago, Ill. (1,777,781).

Parachute. Frank R. Owens, Beaver Crossing, Neb. (1,777,934).

Unicycle glider. Joseph Szakacs, Lincoln, Neb. (1,777,941).

Aircraft. Harold C. Pratt, Swampscott, Mass. (1,777,992).

Exhaust silencer for aircraft motors and the like. Ole S. Bie, Oslo, Norway. (1,778,101).

Seaplane or amphibian. Grover Loening, New York, N. Y.; assignor to Loening Aeronautical Engineering Corporation. (1,778,113).

Airplane brake. Carlton D. Stewart, Berkely, Calif.; assignor to Westinghouse Air Brake Company, Wilmerding, Pa. (1,778,127).

Dirigible airship. Harry Park and William R. Litzenberg, Los Angeles, Calif. (1,778,273).

Aeronautical propeller. Sylvanus A. Reed, New York, N. Y.; assignor to Reed Propeller Company, New York. (1,778,340).

Ballasting device for moored dirigibles. Otto Krell, Berlin-Dahlem, Germany. (1,779,394).

Boat structure for seaplanes. Petter G. Petterson, Lakewood, Ohio (1,778,467).

Collapsible parachute attachment for aeroplanes. Cisro Furlew, Dyersburg, Tenn. (1,778,488).

Leveling apparatus (for aircraft). Louis A. Erickson, West McHenry, Ill. (1,778,-631).

Aerostat. George H. Scott and Frederick M. Rope, Cardington, England (1,778,692).

Aeroplane brake. Marion B. Cowart, Tampa, Fla. (1,778,753).

Aircraft. Clem H. Congdon, Cleveland, Ohio (1,778,782).

Method and means of controlling the operation of aircraft. Anthony H. G. Fokker, Amsterdam, Netherlands (1,778,892).

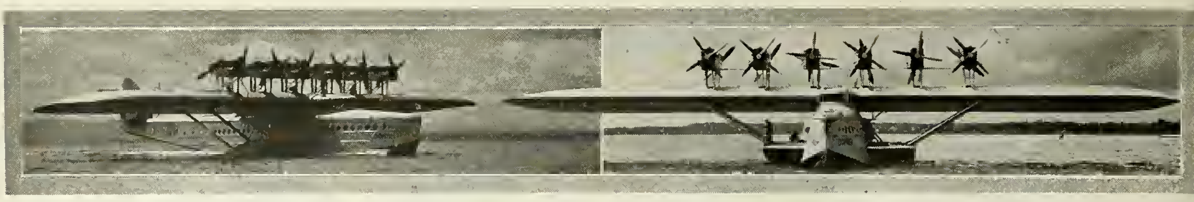
Aircraft. Rene E. Monjouste, New York, N. Y. (1,778,906).

Aeroplane. Edward H. Lanier, Miami, Fla. (1,779,005).

Helicopter. Ralph Tarshis, Brooklyn, N. Y. (1,779,054).

Engine cooling system for hydro-aeroplanes. Adolf Rohrbach, Berlin-Wilmersdorf, Germany (1,779,078).

Wind exposed surface. Edmund B. Cairns, Naugatuck, Conn.; assignor to Cairns Development Company, Wilmington, Del. (1,779,113).



THE DORNIER FLYING SHIP Do.X

IN the September, 1929, issue of AERO DIGEST a description and drawings of the original Dornier Do.X flying boat appeared. Since that time that ship has been provided with American Curtiss engines and undergone other modifications.

The following details relate to the Do.X in its latest form:

Radio Equipment

A most complete radio room serves as a connection with ground radio stations, greatly increasing the safety of the ship. The radio room is located in a soundproof cabin on the control deck between the auxiliary control room and the central control room.

The technical equipment was furnished by the firm of Lorenz in Berlin. It consists of a main transmitter with a wavelength of 600 to 2,100 meters and a short-wave transmitter with a wavelength of 30 to 60 meters. The receiver covers all wavelengths from 20 to 3,000 meters.

The main transmitter is a tube apparatus in an intermediate cycle connection constructed for under-damped modulated sound and for modulated voice waves. As a source of power, a motor generator is used which for the open net is fed by a buffer battery. This battery is used to transmit if desired, so that the main transmitter may be used also in an emergency. The short-wave transmitter is another tube transmitter with two cascades. The radiated wavelengths are determined and kept constant by quartz crystals.

The methods of transmission are monotones and telephony. Heat and anode voltage are taken from one single transformer which is also connected to the net by means of the buffer battery. For reception, a seven-tube intermediate frequency receiver is employed. The intermediate frequency steps may be disconnected so that the receiver may also serve as an audion to strengthen the dual lower frequency. For the source of current the heating battery, as well as the dry anode battery of 90 volts, is used.

The antennae apparatus is made up of a 70-meter trailing antennae for the main transmitter, a Dipol antennae for the short-wave transmitter, as well as an emergency antennae placed between the tail and the wing tips for use when the ship is on the water. A radio compass of the "Telefunken" type is built in the navigation room.

Do.X equipped with Curtiss engines

The station is maintained and manned by the German Company for Wireless Telegraphy, Berlin. Radio Officer Kiel, who has served many years on board ships at sea, is in charge of the radio on the flying ship.

Powerplant

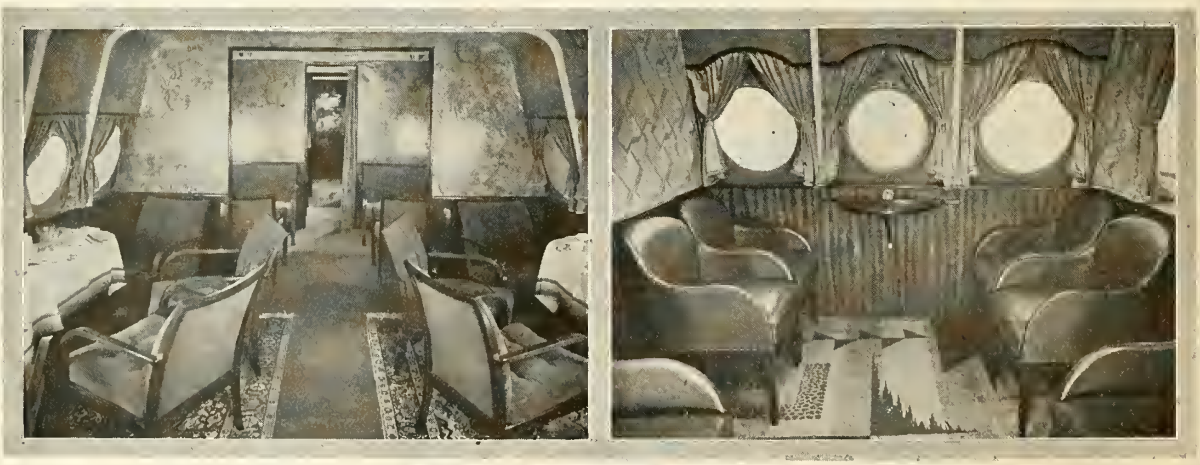
The flying ship employs twelve American water-cooled Curtiss Conqueror engines, Type GV-15700, each delivering 600 horsepower as maximum output. They are housed in six tandem nacelles. One engine in each nacelle drives a tractor propeller; the other, a pusher propeller. Propellers are geared down at a ratio of two to one.

Of especial value is the complete accessibility and possibility for maintenance of the whole powerplant equipment. Through a passageway inside the wings, mechanics can reach the nacelles; the entire fuel system and connections up to the engine connections therefore may be inspected and kept in order during flight. In each engine nacelle there are the same types of control instruments as are arranged in the main control room.

Control Equipment

The control room is above the front passenger room and built close to the service deck. Its situation, together with the arrangement of both the control seats, gives the airplane controls unobstructed view toward the front and side, also vertically below to the water.

Steering mechanism for rudder, elevator and aileron operation is the normal type used in all modern commercial planes and allows of easy operation without the use of auxiliary engines. On the outer side. each control seat has a throttle lever which controls the fuel mixture of each of the six engines on one side. The



Interior views showing the luxurious passenger compartments aboard the Dornier Do.X

tachometers of each of the six engines are read from two accumulation tachometers, which are in the middle of the control room between the two instrument boards right above the deck; signal lamps next to it indicate to the pilot, by means of red and yellow lights, which of the engines are at his disposal.

The instrument control is operated from both seats at the same time so that in long-distance flights the pilots can relieve one another in such a way that only one steers while the other rests or attends to the navigation.

Before both pilots is the Ludolph compass. Underneath on the instrument board are the other instruments as follows: Askania speed indicator, Pioneer longitudinal inclination indicator, Pioneer bank indicator, Askania 500-meter altimeter, lower course needle of the Askania distance compasses, Goerz altimeter up to 3,000 meters and the Pioneer pitch indicator.

Especially important are the compasses, speed indicators, longitudinal inclination indicator and bank indicator, for it is only through their help that flying in the clouds, at night and in fog—that is, blind flying—is possible.

Forward of the control room and with equally good visibility from both sides, is the Gyrorector artificial horizon and the new American Sperry artificial horizon, two gyroscopic instruments for blind flying. On the deck a chronometer is located. Under the starboard seat is the hand wheel for the water rudder and a wheel for operating elevator and rudder compensation.

Under the starboard seat is a central switch, for cutting out the ignition, which is used when it is desired to stop immediately all engines and shut off the lighting equipment.

The commander's room aft of the control room is separated from it by a sliding door. Instructions are transmitted through a speaking tube which connects the commander with the pilots and mechanics.

Safety Appliances

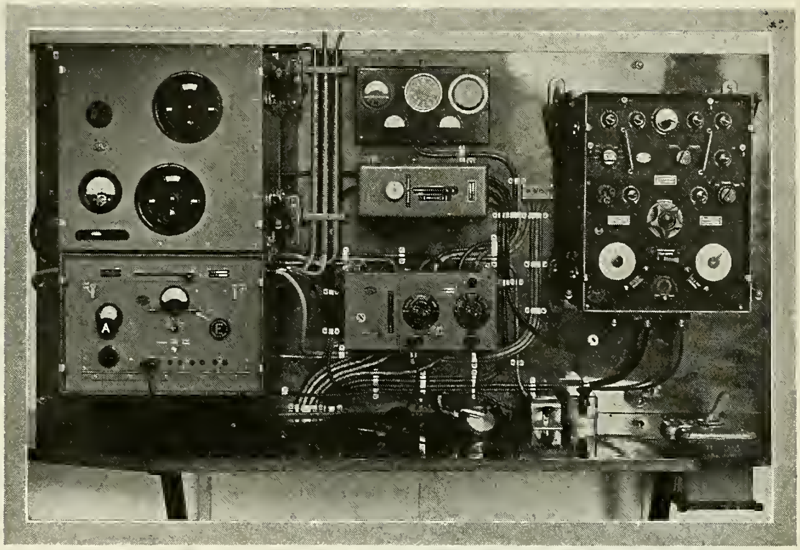
The entire lighting plant is equipped with gas-tight lamps.

The C deck and the body of the flying boat are divided into seven compartments with six water-tight bulkheads. The several divisions are provided with fire extinguishers and bilge apparatus which may be controlled centrally. For ventilation of the fuel room on the C deck, ventilators and automatic aerotors have been installed.

As ship boats there are two hack boats and a rubber boat in addition to life preservers and rafts as usually found on ocean-going vessels. Heavy anchors and stabilizing water floats are carried. There is complete equipmnt on board for repairing and conserving the various safety appliances.

Fuel Apparatus

On the fuel deck there are four cylindrical fuel tanks with a capacity of 3,000 liters (792 gallons), two of 1,700 liters (449 gallons) as well as two small containers in the wings of 300 liters (79 gallons); the contents in all being 16,000 liters (4,227 gallons) of fuel. The tanks are laid directly on the boat floor and are joined below by a collector chamber. From this the fuel is pumped to the wing tanks and led to each engine by means of a Lamblin engine pump.



Radio equipment of the Do.X for voice and code communication

WRIGHT CYCLONE ENGINES for 1931

THE Wright Aeronautical Corporation recently announced the production of two new engines for commercial and military use, the Cyclone models R-1750-E and R-1820-E.

The new engines are nine-cylinder static-radial air-cooled types, representing the latest development of the Wright Cyclone series which is in use by both the Army and Navy, and is standard equipment for many transport ships.

The new 575-horsepower engine, model R-1820-E, is the most powerful engine yet developed in the Cyclone series. The specifications represent an enlargement over any previous model. Although the engine develops more than 600 horsepower at its normal 1,900 revolutions per minute, it has shown great overload capacity. Each engine is rated below its normal capacity.

The new 525-horsepower Cyclone, model R-1750-E, is a direct development of the 1929 Cyclone with refinements which have increased its normal power output over the older model. An order for this new model by the United States Army Air Corps was recently announced by Guy W. Vaughan, president of the Wright Aeronautical Corporation.

It is interesting to compare the R-1820-E Cyclone and the Wright Whirlwind engine which Colonel Lindbergh used on his flight over the Atlantic in 1927. The new Cyclone develops nearly three times the power of Lindbergh's engine with only a 60 per cent increase in weight. The Lindbergh engine weighed 2.60 pounds per horsepower; the new engine weighs but 1.35 pounds per horsepower.

The average maximum cylinder head temperature of the Lindbergh engine was approximately 575 degrees Fahrenheit; the cylinder head temperature on the R-1820-E is 375 degrees. This reduction in temperature has been achieved in spite of the fact that the new motor has only about 65 per cent of the cooling area per cubic foot of cylinder displacement, as compared with the Lindbergh engine.

The temperature reduction has been accomplished by refinements of design of the cylinder head, the Wright spark plug coolers, and by air deflectors which direct the air around the cylinder head and barrel.

A compact centrifugal band type clutch is incorporated in the supercharger impeller drive, thus relieving the gears and shafts of the loads caused by sudden accelerations and decelerations normal to all internal combustion engines.

Specifications

Wright Cyclone R-1750-E

Normal speed	1,900 revolutions per minute
Bore	6 inches
Stroke	6.875 inches
Piston displacement	1,750 cubic inches
Compression ratio	5.1 to 1
Average weight	860 pounds
Guaranteed power, normal r.p.m.	525 h.p.
Normal power, normal r.p.m.	550 h.p.
Fuel consumption	.55 lbs. per b.h.p. hr.
Oil consumption	.035 lb. per b.h.p. hr.

Wright Cyclone R-1820-E

Normal speed	1,900 revolutions per minute
Bore	6.125 inches
Stroke	6.875 inches
Piston displacement	1,823 cubic inches
Compression ratio	5.1 to 1
Average weight	865 pounds
Guaranteed power, normal r.p.m.	575 h.p.
Normal power, normal r.p.m.	605 h.p.
Fuel consumption	.55 lb. per b.h.p. hr.
Oil consumption	.035 lb. per b.h.p. hr.

DIGEST OF FOREIGN TECHNICAL ARTICLES

By Elsa Gardner

PROPELLER HUB STANDIZATION

The Standardization of the Nose of Engines (La normalisation des nez de moteurs), J. Volpert. "Aeronautique," Vol. 12, No. 134, July, 1930, pp. 248-250, 7 figs.

THE difficulties to be overcome in designing a propeller hub on which may be mounted the various types of metal propellers are outlined with the problems added because of reduction gearing. The author states that a hub should be designed so that without any machining whatever, the Levasseur or Bréguet thin propeller, the Chauvière thick type, the Ratier variable-pitch, or the Gnôme-Rhone propeller, may be mounted on a given engine.

Designs of gearing developed by the Hispano-Suiza, Renault, Farman, Lorraine and Salmson engine manufacturers are detailed, as well as the methods employed by the above mentioned propeller companies for attaching the blades to the hub.

The author suggests that the best means of gearing is by the plate joining the greater part of the support and considers it easy to design a plate adapted to all types of propellers, such as he outlines.

AIRCRAFT MATERIALS

The Development of Materials for Aircraft Purposes, W. Rosenhain. Royal Aeronautical Society "Journal," Vol. 34, No. 236, August, 1930, pp. 631-642, and (discussion) 642-648, 3 figs.

PROPERTIES which will be required of aircraft materials in the future are discussed. Aluminum alloys and Elektron are compared, and the future of beryllium is predicted. The author considers the various metals from the standpoint of stiffness and of resistence to fatigue, corrosion, wear, and high temperatures, and outlines the results obtained in the research conducted by the National Physical Laboratory.

He concludes that welding must be the form of construction eventually used but thinks that the most serious objections are because of the fact that the method confers on the metal a structure of a cast and not of a wrought material, that one cannot be sure that a given weld is a good weld, and that in welding we undo all that the heat treatment or cold working can do to increase the strength and hardness of the material. He considers that the only way out of the difficulty with the materials we have at present appears to be reheat treatment after welding.

GLIDING IN GERMANY

Ten Years' Gliding and Soaring in Germany, W. Georgii. Royal Aeronautical Society "Journal," Vol. 34, No. 237, September, 1930, pp. 724-746 and (discussion) pp. 749-757, 32 figs.

TEN years of development and an unbroken series of ten gliding competitions held at the Wasserkuppe on the Rhône are described. After referring to the designs of the best known German high-performance gliders from the "Vampyr" to the "Wien," the author, who is a specialist in meteorology, explains the technique of cross-country soaring flight. The two examples selected are the masterly flights of Nehring on the Darmstadt and Hirth on the Lore, from a starting point around a fixed mark and back. The results gained from Kronfeld's flight, in which a record height was obtained in the up-current of a cumulus cloud formation, are outlined. Investigations made by the Research Institute of the Rhön-Rossitten Gesellschaft are taken up.

This article is followed by one in which F. Stamer describes the flying school at the Wasserkuppe, giving details of the hangars and buildings, and methods of training.

HIGH SPEED HEAVY OIL ENGINES

The Present Position of the High-Speed Heavy-Oil Engine, S. J. Davies. "Engineering," Vol. 130, No. 3380, October 24, 1930, pp. 532-537.

AN outline of the special advantages which permit the heavy-oil engine to enter the field against such a well established rival as the gasoline engine precedes a comparison of the characteristics of various types of oil engines in use. Tables give the specifications for American, British, and Continental high-speed heavy-oil engines showing the type of combustion chamber for each.

Details are given of the Hesselman engine which incorporates an ignition arrangement of the gasoline engine and avoids the high compression and maximum pressure usual in compression-ignition engines. The superiority of the design as regards loading on the running gear is indicated in the tables. Much better thermal efficiencies are obtained than with the gasoline engine at full load, and it approaches those of anti-chamber engines at reduced loads.

Paper presented before Section G of the British Association at Bristol.

WORLD CIVIL AVIATION

Report on the Progress of Civil Aviation, 1929. British Air Ministry-Directorate of Civil Aviation, 87 pp. 16 figs., 7 maps.

IN the first chapter under the section devoted to progress in British civil aviation, a review of the work accomplished by Imperial Airways during 1929 is given with the progress made in aerial photography and surveying, miscellaneous commercial flying, airplane clubs, air races, long-distance flights, university air squadrons and training of reserve officers. In the chapter devoted to the aircraft industry, the various designs of planes, airships and engines are discussed and the aeronautical export trade compared with that of the United States to showing Great Britain in the lead. Ground organization, navigation and civil administration are covered in subsequent chapters.

The second section reviews briefly civil aviation in the Dominions, India and the Colonies, while the third section covers America, Europe and Asia. In the table of air transport statistics for 1928 and 1929, it is shown that the United States is the leader by a good margin for route mileage, miles flown, and passengers, freight, and mail carried in 1929.

STEEL CONSTRUCTION

The Construction of Aircraft in Steel, F. M. Green, "Aircraft Engineering," Vol. 2, No. 20, October, 1930, pp. 249-251, 11 figs.

THE purpose of this paper is to give some of the reasons which led the Sir W. G. Armstrong-Whitworth Aircraft, Ltd., to select steel for aircraft construction, to describe a system of construction used, and to tell of the experience gained in the manufacture and supply of steel aircraft during the last ten years. The chief reasons given for the choice of steel in preference to aluminum alloys are its reliability and the fact that it is essentially a British product and more easily obtained in a national emergency.

The results of a mathematical investigation made by Major Wylie on the effect of forming corrugations in thin shells are discussed with details of a system developed and applied to a very large variety of spars. Nickel-chrome and plain carbon strip steel are employed.

Spars are joined with hollow steel rivets closed under a press and ribs are of channel-section steel braced with open-jointed square tubes made of strip steel. The enameling process is said to furnish complete protection against corrosion.

Paper presented before the Fifth International Air Congress.

ENGINE RESEARCH

The Practice of Research, J. F. Alcock and H. S. Glyde. "Aircraft Engineering," Vol. 2, Nos. 19 and 20, September and October, 1930, pp. 227-231 and 263-264, 13 figs.

EQUIPMENT provided and methods employed by Ricardo and Company for their internal-combustion-engine research are taken up, the first article being devoted to details of the apparatus, and the second to the actual procedure in carrying out the tests. The test department comprises one large single-story building and two smaller ones, housing 32 test beds in all.

The experimental work covers fundamental research on basic problems, such as combustion and supercharging, the testing of engines designed for commercial purposes, and research on fuels and lubricants. With regard to detonation there are two main types of tests; namely, the determination of the characteristics of fuels (or fuel dopes) in a special variable-compression engine and the investigation, for design purposes, of the limiting compression ratio which can be used on a given engine with the fuel on which it has to run.

ANTI-KNOCK RATING OF FUELS

Influence of Engine Conditions on the Anti-knock Rating of Motor Fuels, R. Stansfield. "Engineering," Vol. 130, Nos. 3378 and 3380, October 10 and 24, 1930, pp. 468-471 and 512-514, 7 figs.

TESTS carried out in the engine research laboratory of the Anglo-Persian Oil Company are outlined. The effects of engine design, jacket temperature, inlet-air temperature, throttling, ignition advance, alteration of plug-point gap and plug reach, and of humidity in the testing of fuels for anti-knock rating are indicated. Bartho-

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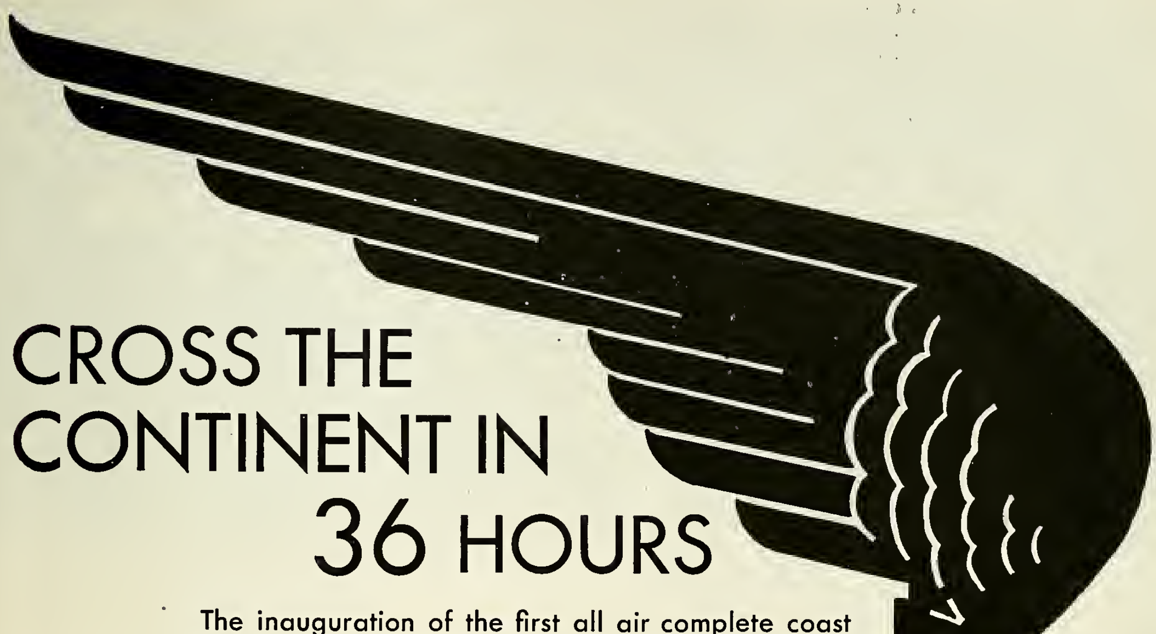

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(*Continued from preceding page*)

lomew's tests with cylinder-jacket temperatures of from 212 to 400 degrees Fahrenheit were repeated. It was found that fuels for air-cooled engines should be tested with higher jacket temperatures than is necessary with fuels for use in water-cooled engines.

Modifications made to the Armstrong-Whitworth spirit testing plant are referred to. Three types of knock which can occur are defined. The third type of knock (that caused by preignition and characterized by shock pressure rise and sudden fall of engine speed) the author considers much more dependent upon details of engine design and working conditions than true pinking.

AERONAUTICAL PROGRESS

The Year 1929-1930 in Aeronautics (L'Année Aéronautique 1929-1930), L. Hirschauer and C. Dollfus. Dunod, Editeur. 456 pp., many figures and maps.

THE first part of this review of world aeronautical achievements during 1929-1930, published by the Société du Carburateur Zenith, deals with specifications of equipment brought out during this period and covers 158 civil and military planes, the autogiro, three airships, and 14 engines, including four Diesels. Under performances, the second section outlines airplane records achieved, races, competitions, glider performances, balloon contests, long-distance flights, and the Guggenheim Competition.

Airplane shows are briefly discussed in the third section, while the section following, devoted to the organization of public works in aeronautical matters, gives some interesting figures regarding the various government subsidies. The fifth section air transport statistics for 30-countries besides France.

The last section is most useful for reference. It lists the addresses of all the aeronautical equipment manufacturers in the world as well as those of air transport companies, aeronautical societies, administration, and periodicals. The appendix contains an article entitled "Carburetion in Acrobatic Flight."

SPORT PLANE INTERNATIONAL AIR TOUR

The Technical Part of the Second International Air Tour 1930 (Der Technische Teil des 2. Internationalen Rundfluge 1930). W. Hueber. Zeitschrift fuer Flugtechnik und Motorluftschiffahrt." Vol. 21, No. 19, October 14, 1930, pp. 512-523, 13 figs.

METHODS of rating the performance of airplanes taking part in the Second International Air Tour of Europe are discussed and the reasons for the selection of certain standards are given. Under the accomplishment of the technical tests, the preparation required and the personnel, the duration of time and the points are covered, and tests of weight, equipment, starting, fuel consumption, take-off and landing are described in detail. The seven tables show the weights and classification of each plane participating, as well as the points allotted to each in every test.

Other articles in this issue of the magazine are devoted to the purposes of the tour, a description of the airplanes participating, and details of the instrument boards used.

AERODYNAMICS

Concerning the Aerodynamic Behaviour of a Wing Produced from a Plain Wing by Deformation (Sul comportamento aerodinamico di ali dedotte per deformazione da un'ala piana) G. A. G. Androcli. "Notiziario Tecnico di Aeronautica," Vol. 6, No. 8, August, 1930, pp. 119-148.

THE author turns from a wing with constant profile to an elliptical contour formed of two homothetic semi-ellipses in ratio of one to three, in which all the chords are coplanear. He examines the effects in the aerodynamic characteristic curve produced by the following: A warping or rotation of each section about its focus, supposed to be lying exactly on the large axis common to the two ellipses mentioned above; a bending, or a shrinking back or advancement of a single section through translation along the chord; a ring, or parallel displacement also the same as a single section normal to the wing plane, thence to that of the primitive chord.

At the base of all calculations there is an integral equation of a more general type than that used in the theory of Prandtl, which permits the rules of the variation of the aerodynamic characteristics to be applied for a wing differing somewhat from the one given.

The Aerodynamic Behaviour of a Wing with a Section not Constant, or Subject to Non-Uniform Currents, and Concerning the Effect of the Fuselage (Comportamento aerodinamico dell-ala a sezione non constante, oppure sottoposta a corrente non uniforme e sull'effetto di fusoliera), G. A. G. Andreoli. "Notiziario Tecnico Di Aeronautica," Vol. 6, No. 9, September, 1930, pp. 243-269.

SUPPOSING that the reader has studied the variations of a wing with a profile of constant form, in an article published in the preceding issue of the magazine, the author explains the effect of a variation of profile or the results of a distribution of non-uniform velocity—that is, the wing subject to an interrupted current. By means of integral equations, he gives the laws of variation of the aerodynamic characteristic.

He determines the effect of the fuselage and calculates the complete wing-fuselage apart from the isolated characteristics of one or the other. The effect of motion on the strength due to the fuselage, and the effects of two horizontal and two lateral vortices, are also considered.

It is shown through particularly simplified hypotheses concerning the interrupted current that in each way the experimental facts are confirmed so that in the complete wing-fuselage interpenetration one can consider the fuselage as substituted by the corresponding piece of wing in the first approximation; and in each case the experimental facts and the theoretical means, prove that a fuselage with a somewhat rectangular section gives better results than one with a round section.

DETONATION

Theoretical Research on the Phenomena of Detonation in Internal Combustion Engines (Ricerca teorion sul fenomeno della denotazione nei motori a scoppio), G. Manzella. "Notiziario Tecnico Di Aeronautica," Vol. 6, No. 8, August, 1930, pp. 149-162, 5 figs.

THE author takes into account the different physical conditions in which combustible and incombustible gas are found in the cylinder of an internal combustion engine during combustion, and determines the effects of temperatures and pressures, facts upon which detonation depends. He considers the effects of using two spark plugs, or of turbulence if detonation were the result of the attainment of high temperatures either through the compression of the incombustible mixture or through the heat discharged by the products of combustion.

RUDDER TESTS

Maximum Force on Rudders, F. B. Bradfield. Aeronautical Research Committee—Reports and Memoranda No. 1329 (Ae. 461), April, 1930, 4 pp., 12 figs.

AS a step towards determining the airworthiness requirements for rudder strength in the cases of all-moving rudders, model tests have been made from which the lift coefficient of various rudders may be deduced. In a table is shown the outline of each rudder with sufficient data (where available) to reconstruct its lift curve.

Results cover: the monoplane tail with rudder behind the fin, and with the all-moving rudder; the biplane tail with rudder behind the fin and the all-moving rudder; and the all-moving rudder tested alone. The author considers that the maximum lift coefficient for a fin and rudder (calculated on the total area) may be in the neighborhood of 0.35 for zero yaw, unless seriously shielded when it will be less. A value of 0.6 may be reached when yawed. For an all-moving rudder free from shielding, the maximum lift coefficient may be as high as 0.6, but in general will be less because of the body screening. Between tailplanes, at least as high a value may be expected.

Maximum Lift Coefficient of R.A.F. 30 All-Moving Rudder. F. B. Bradfield. Aeronautical Research Committee—Reports and Memoranda No. 1321 (Ae. 458), February, 1930, 4 pp., 4 figs.

IN this investigation of the lift coefficients of an all-moving rudder of R.A.F. 30 section with aspect ratios of 1.5 and 3.0, both alone and as part of a biplane tail, lift was measured up to stall. The wings and fuselage were not represented. It is shown that a R.A.F. 30 rudder at $R = 0.25 \times 10^6$ has a large increase of maximum lift coefficient when placed between biplane tailplanes. Tests of a cambered airfoil betwen end plates, made at Göttingen, suggest that this large increase is not general.

STRUT TESTS

Wind Tunnel Tests of Seven Struts. A. S. Hartshorn. Aeronautical Research Committee—Reports and Memoranda No. 1327 (Ae. 460), November, 1927, 12 pp., 6 figs.

THE discussion in this report covers the results of tests made on seven sections of struts for the guidance of the British Engineering Standards Association in standardizing the manufacture of steel tube struts. Three streamline and three elliptical sections of fineness ratios 2.0, 2.5, and 3.0, and one special strut of fineness ratio 3.03, each having a major axis of five inches, were tested for drag over a speed range of from 60 to 120 feet per second. The effect of yaw on drag and cross wind force was measured at 60 feet per second.

The streamline struts of fineness ratio 3.0 and 3.03 give the lowest drag per unit of frontal area, and the absolute drag per square foot of frontal area for a long strut is considered to be approximately 0.8 pounds at 100 feet per second.

RELATIVE FLIGHT SAFETY of the AUTOGIRO

By
Thomas Carroll

Thomas Carroll, who has been perhaps this country's best known test pilot, was for ten years with the National Advisory Committee for Aeronautics, an advisor to aviation financial interests and he also served as test pilot for the Guggenheim Safe Aircraft Competition. He is now with the Kellett Aircraft Corporation of Philadelphia, an American Autogiro licensee.

THE aviation industry has been waiting for a machine which from the standpoint of safety would not represent about 90 per cent piloting skill and 10 per cent stable aerodynamic design. Application of flying to the work-a-day transportation needs of most people clearly hinges upon this point.

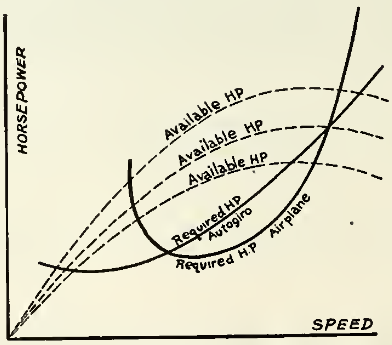
In the Autogiro we have been given such a machine. In fact, one might say that the element of personal safety is governed, in the Autogiro, in ratio of about 10 per cent piloting skill and 90 per cent inherent aerodynamic stability. The safety of the rotating-wing craft is about as high as can be hoped for in any field of mechanical transport.

So far as flying students are concerned, it seems to abolish the very real and psychological hazards which beset the student on even the best of modern training ships. After a very little dual instruction, and that of the most elementary nature, a student can be allowed to learn the finer points of maneuvering the Autogiro by himself. His instructor need not worry about his ability to land, or the likelihood of his getting into a spin through loss of flying speed. The Autogiro lands itself easily on any selected spot.

Of course a novice will not fly the machine as efficiently or as well as an experienced pilot, but in the case of an Autogiro he is safe while learning. He is placed in much the same position as when learning to drive a motor car. Mistakes are not necessarily dangerous. If he becomes confused, he can stop and let the ship land itself.

Development of all mediums of mechanical transport has always waited upon the invention of devices which could successfully check and control the great speeds of which they are potentially capable. Railroad trains could travel at high speeds long before commercial train schedules reflected these speeds. The Westinghouse Air Brake made possible the safe speeds now attained on the railroads. Four-wheel brakes have done much the same for the motor car.

The Autogiro is the first heavier-than-air craft to embody in its design this ability to check its own speed. Incidentally, this one factor gives an amazing sense of security while flying this machine.



Graphs illustrating relative shapes of the required H.P. curves in function of the speed for two normal equivalent machines, one airplane and the other Autogiro. They show that the available horsepower determines whether or not the Autogiro will have greater speed

The Autogiro is more practical and safer than lightly-loaded airplanes of fairly low landing speed which have been designed to attain the same ends.

The Autogiro's landing speed is nil, so that no airplane can hope to approach it on this score. Then too, lightly loaded planes are notoriously difficult and uncomfortable in anything more than light winds, and although they often do land quite slowly, their tendency to float around while gliding in makes placement on a pre-determined spot extremely problematical. Their payloads and high speeds are much below par.

In contrast to this an Autogiro may be set down vertically on any spot selected by the pilot. In a rough wind, its flexible structure does much to iron out the discomfort of bumps. Its efficiency in payload and high speed is high, and will no doubt be much higher as commercial models appear.

Its efficiency and safety in vertical descent is much greater than in a parachute, and the stability in forward speed is the same as that of an airplane.

I have purposely flown the older experimental models made in this country to avoid unfair comparisons of the best of recent Autogiros with average airplanes. Nevertheless, the comparison, if there is any, is all in favor of the rotating-wing machines. It would be practically impossible to overstate my optimism for this style of flight.

While the close policy of the Pitcairn interests during the Autogiro's purely experimental stage had caused it to be felt by many in the industry that the Autogiro was somewhat of an unknown and questionable quantity, I think that there is now no doubt of its welcome reception as coming at a time when safety in aircraft is most needed from the standpoint of the industry and the public.

An Autogiro being landed only about 75 feet from a clump of trees

CONTROLLABILITY OF AN AIRPLANE AT LOW SPEEDS

Controllability at Low Speeds and Full-Scale Measurement of Lift and Drag of Parnall "Peto" Fitted with R.A.F. 15 and R.A.F. 31 Section Wings (Slotted and Unslotted), R. K. Cushing. Aeronautical Research Committee—Reports and Memoranda No. 1320 (Ae. 456), January, 1930, 11 pp. and 10 figs.

RESULTS of performance tests of the Parnall Peto to determine the most efficient set of wings which would at the same time give adequate lateral control at the stall are discussed. In addition to the ordinary performance measurements, lift and drag were found over a range of incidences up to stalling incidence and observations were taken of the behavior of the aircraft near the stall.

The maximum lift coefficients are considered about normal for the wing arrangement.

PERSONAIRLITIES

BY

Cy Caldwell

DESPITE the Pollyanna-like bawling of such purely American phenomena as the "success" magazine writers, the pep and efficiency boys, and the so-called self-made men, I remain convinced that most of the good or ill fortune we encounter as we journey through life was prepared for us long before we blinked our eyes and took our first amazed look at this earthly scene. Even the "self-made" man must admit that, if he hadn't been made of pretty fair stuff to start with, he couldn't have gone ahead and developed it into what he is now so pleased with.

All of which is merely introductory to the presentation of one Howard Hughes, air pilot, machinery manufacturer, oil producer, motion picture producer and director —and all at the age of twenty-six. There's also a flock of many millions of dollars that follows submissively at the heels of the said Hughes, but we needn't give him any credit for them, for they simply arrived by an accident of nature when his father passed away. I believe he added to them, however, so he must be credited with business ability and the uncanny skill of making two millions grow where only one grew before. So many rich men's sons are only capable of making zeros grow, you know.

At the age of twenty-one, when he fell heir to a tremendous personal fortune, Howard Hughes could have bought Government bonds and sat down for the rest of his life. But he was the son of a man whose inventive genius had given the oil industry its most necessary tools; he had the same kind of pushing, inventive, reaching mind, and he had to use it. I don't imagine he had much choice in the matter. He was what he was born, as I have tried to indicate that most of us are; the race horse sires another race horse; the donkey is the father of another donkey—which possibly explains radio crooners.

Young Hughes promptly took over his father's business and surprised everyone with his keen business acumen, adding greatly to the Hughes' fortune. He didn't need the money; he simply needed mental exercise, and took it. Still needing exercise, he went to Hollywood, though he didn't go in for the standard exercise of those parts. Instead, he silently financed a picture called "Everybody's Acting," which brought him big returns. Then he formed the Caddo Company, named after Hughes' oil field in Texas, and became a full-fledged producer. He made "Two Arabian Knights" and "The Racket," which were financially successful; and then he went into the production of "Hell's Angels," playing the part of the angel himself. It is said that he spent from two and a quarter to four millions on the production —the real amount seems to be clothed in mystery, as it invariably is in Hollywood. I'd guess about three millions, myself; and I'd also guess it all isn't coming back, but most of it may. Anyhow, Hughes has had his fun and mental exercise with it, and if he doesn't make a profit I suppose he'll be just about as happy as if he did.

In Houston, Texas, Hughes had taken his first flight at the age of fourteen. The air bug got him right then. He built his own plane and flew it, I am told, and I don't doubt it. Probably his father wouldn't give him the money to buy a ship, so he made one from parts of cracked up ships around Houston. But he flew and kept on flying, finally directing all of the air scenes in "Hell's Angels" personally—of course with the assistance of other pilots. J. B. Alexander, Col. Roscoe Turner, Harry Crandall, Frank Tomick, and Frank Clarke were some of the 125 pilots employed by Hughes. He should get a medal for giving so many jobs—in fact, if he'll start another picture like that now we'll give him two medals and have him put on a Hoover commission.

Hughes' agents scattered all over this country and Europe, digging up war-time planes, because he wanted the picture to be realistic. They collected Fokker D-7's, S.E.-5's, Camels, and Snipes, and that old Sikorsky of Roscoe Turner's. A quarter of a million was spent on these ships. Dr. K. Arnstein, formerly of the Zeppelin Works, designed a reproduction of a war-time dirigible which was constructed and actually flown for the Zeppelin sequence. This cost $500,000 alone.

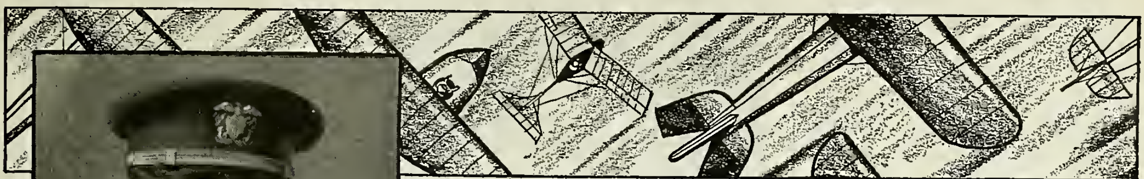
Production started, and the costs mounted. First they made it as a silent picture and had it ready for release when the talking picture came along—so they scrapped most of it and made it all over as a talkie. If television had arrived, Hughes would have scrapped the talkie and made it all over in television, I suppose. He's a remarkable fellow!

And the result? Well, don't fail to see it. It is the most expensive, the biggest, and one of the most thrilling pictures made of aerial warfare. For the amazing air scenes, and for them alone, it is worth seeing. The Zeppelin sequence is one of the finest things ever done in film; you'll sit spellbound as it unrolls before you. And the dog-fight above the clouds is something that has never been done anywhere except in the war.

The story, most regrettably, is standard movie tripe, utterly unrelated to real life. Such a setting, such an outlay of time, money and talent, should have been expended upon some vast and enlightening comment on life, and not on a tawdry movie thriller. A theme as grand as that in the "Four Horsemen of the Apocalypse" would

(Continued on next page)

Howard Hughes, motion picture producer extraordinaire, and an air battle scene from "Hell's Angels"



LIEUT. RALPH S. BARNABY

In 1911, Lieut. Barnaby qualified for the Early Birds Association by his self-instructed gliding flights. In August, 1929, he soared for 15 minutes and 6 seconds at South Wellfleet, Mass., thus becoming the first person in this country to qualify as a first-class glider pilot. For this flight, he received from the National Aeronautic Association (F.A.I.), First-Class Glider Pilot Certificate No. 1. It was Lieut. Barnaby in January of this year, who launched his glider from the airship Los Angeles in flight over Lakehurst, reaching the landing field 3,000 feet below over 12 minutes later.

Lieut. Barnaby's official duties as Chief of the Specifications Group, Scientific Section, Bureau of Aeronautics, U. S. Navy, are an indication of his ability to give expert help on construction details, materials, etc., etc.

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Airplane Mechanics Rigging Handbook

by R. S. Hartz, *formerly Lieut. Colonel, Air Corps, U. S. Army;* **and E. E. Hall,** *Lieut. Air Corps Res.* **267 pages, 104 ill., $3.50**

No plane can land safely with a collapsed interplane strut or minus one wing. This book tells how to get an airplane into safe flying condition and how to keep it that way. It is written in plain language, and in great detail, showing just how each operation should be done, in what order, and the reasons why.

Among the topics covered at length are: handling and dismantling an airplane; stresses and strains; sequence of rigging steps; truing up the fuselage, the center section, and the wings; adjusting the angles of incidence and dihedral; overall adjustments; spars and struts; splicing and fitting; controls and adjustments for instability; practical hints for riggers; inspection; installing and correction of compasses; etc., etc. In addition to telling all about rigging, the authors have collected and arranged a mass of information about fabric, wood and glue, metal parts, wire, dopes and doping, and parachutes.

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(PersonAILlities continued)

have fitted Hughes' wonderful setting; and I hope that he will go on with the financial tools and the producing genius that are his and give us a really great picture. There is vast difference between a big picture and a great one.

There are many inaccuracies in the production. Planes take off at night in formation—a thing not done during the war. In formation they follow a Zeppelin through the clouds, something that I do not believe ever was done. Then the Zeppelin drops its bombs—and still remains so heavy that it cannot rise sufficiently to lift the observer's car into the clouds only a few feet above him! Actually, it would then have been light enough to rise far above its former level when loaded down with bombs.

I don't believe that any bomber ever collected as many bullets as that Sikorsky did, and still kept on serenely. Still, the Sikorsky had a high lifting capacity, so it may have been able to take a ton of lead with it. Furthermore, the picture was sadly miscast. English officers and English women did not talk with American accents. And British officers did not amuse themselves by baiting an old batman serving as a waiter; nor did they frequent cafes or other places of diversion that were open to enlisted men; it was an aristocratic army. And I was surprised to see Miss Harlow start so sweet and end so tough. Tut, tut!

However, in this life we take the rough with the smooth, the plausible with the impossible. Leaving all of this stuff out, "Hell's Angels" remains a wonderful picture, well worth seeing for its air work only. It is too bad that Howard Hughes, if he *had* to have a story, didn't use that old one credited to David Belasco, and then run his air sequences just as they are. The opening scene is a flat, with a young officer about to depart for the front. He is kissing his wife goodbye.

The scene fades, and we see all the flying part of "Hell's Angels," just as Hughes has so vividly presented it to us. Then, when that is all over, we switch back to a darkened flat. A man and a woman are sitting in tight embrace on the sofa. She is kissing him and he is kissing her—the usual goings-on in a darkened flat. Suddenly the door opens. The husband we previously saw departing has returned. He sees the two on the sofa, draws his service revolver, shoots them both, turns up the lights, looks at the bodies, and exclaims: "Good Heavens! I'm in the wrong flat!"

"WITH twelve hundred chariots, and threescore thousand horsemen: and the people were without number that came with him out of Egypt; the Lubims, the Sukkiims, and the Ethiopians." II Chronicles, 12: 3.

This verse is not descriptive of Rear Admiral Byrd's expedition to the South Pole, but of the Egyptian King Shishak's march

Captain Alton N. Parker, U.S.M.C.

on Jerusalem. However, in some respects it bears a startling resemblance to an account of the Byrd expedition. "With twelve hundred chariots" checks with the numerous sea, air and land chariots of the Great Byrd; and the "threescore thousand horsemen" of King Shishak don't outclass Byrd's Navy by more than a few odd dozens. I should say, off-hand, that both expeditions cost about the same amount of money. Even if Shishak had a few more men with him, we must remember that in those days Lubims, Sukkiims, and Ethiopians came cheap. Anyone with eight dollars and a trumpet could raise an army of Sukkiims or even Lubims, in practically no time. And to this day Ethiopians aren't high salaried.

But in yet another point do these two great expeditions resemble each other, and that is in the anonymous status of the individuals who went with Shishak, King of Egypt, and Byrd, King of Showmen. Right diligently have I searched Second Chronicles for the names of those who accompanied Shishak. And, verily, I find them not. Nowhere in the Bible do I read, for instance, that "Dean Smith, the well-known Lubim, piloted a chariot for King Shishak," or that "Parker, the popular Sukkiim, was along with the boys." Those who accompanied King Shishak were designated simply as Lubims, Sukkiims and Ethiopians, and may account themselves fortunate to have even their nationalities mentioned. They were merely Shishak's army, and merely as Shishak's army have they come down to us.

In like manner all that our children will know of Byrd's expedition will be that Byrd went to the Pole, accompanied by a flock of Lubims, or Americans, or Norwegians, or Sukkiims. To posterity they shall be nameless as the sands of the sea—"the people were without number that came with him out of Egypt." They didn't even have a number, let alone a name.

In fact, not only to our children shall they be nameless, but even to ourselves of this generation. I, for example, am thinking of that Byrd expedition now—and to save my life I cannot recall more than four names! And those four names I remember only because they belong to men personally known to me—Dean Smith, Alton Parker, Bernt Balchen, and Russell Owen. The rest of the Byrd outfit bulk in my mind merely as Sukkiims. "And the people were without number that came with him out of Egypt." Substitute New York for Egypt and you have it up to date.

If I only remember four—and merely because I know the men—how many does the public recall by name? Four less than I do, is my guess. They may remember the dogs—the dogs got a staggering amount of publicity because they couldn't possibly compete on the lecture platform—but the men, I venture to assert, already are nameless. They're just a bunch of Sukkiims.

And the sad part of it is that nobody's to blame—least of all Rear Admiral Byrd. Unlike a well-known air passenger whose press releases made it appear that he was pilot and radio operator as well as passenger, Admiral Byrd is a thorough gentleman and sportsman who always is anxious to give due credit to his men, mentioning them by name frequently and giving them praise for their work. But it is the sorry memory of the public, of which you and I are two erring members, that defeats Byrd's just intentions. He tells us about them, names them, praises them—and we forget them. Yesterday, heroes—today, Sukkiims.

It is in an effort at least partially and for the passing moment to correct this lapse of memory that I dig out of the mould of obscurity one Alton N. Parker, Sukkiim, and member of the National Air Pilots' Association. Parker was one of the people without number who came out of Egypt or Akron or maybe Weehawken to swell the horde who descended upon the Antarctic to wrest from it undying fame for Byrd and countless columns of news for the New York *Times*. Just what odd psychosis it was I do not know, but something gripped poor Parker and drove him from the more or less endurable existence of one in civilization—if Akron can be so classed—to the well-nigh unendurable boredom and discomfort of Antarctica. Perhaps he had been dissappointed in love or the market—both, like African golf, being subject to unhappy chance. Perhaps he had grown tired of his sheltered existence, and longed to battle again with the elements, as his caveman ancestors had done—everyone in Akron had a caveman for an ancestor, usually a recent one, no matter what the fundamentalists may say. Be the reason what it may, the good ship *Something-or-other* of the Byrd expedition—I've even forgotten the names of the ships—sailed or chugged away with the expectant Parker aboard.

While he paces the deck, a greenish pallor stealing over his face, let us examine the past of this humble explorer, unknown to fame and public relations counsel. The biographical data of this poor lad are, unfortunately, extremely fragmentary, although he wrote them himself. I asked him to give me a biography, and this is how he started

(Continued on next page)

(*PersonAIRlities continued*)

it: "Entered service June 21, 1917. Finished mechanics' school and went on beach as First Class Machinist's Mate." The time and place of his birth remain a mystery, as does his life until that fell June 21, 1917. Perhaps he doesn't figure that he was living at all until he entered the service—in fact, if he was in Akron then, where I met him first seven years ago, he had a good reason for dating the start of his life from the moment he boarded a train for other parts.

He was recommended for flight training by a humble Junior Grade Lieutenant named Richard E. Byrd, who even at that period of his career could pick out good men. Byrd's success, by the way, like the success of all leaders, has been dependent very largely upon his shrewd ability to pick men. Parker was sent to Boston Tech. He finished ground school there and then went to Key West, Florida, for flight training. I can imagine no more startling transition than that from the Puritanical surroundings of the Back Bay to the free and easy, rather Spanish influences of Key West, where old buccaneers used to roll ashore to spend their swag. It was in Key West that Parker must have been bitten by the adventure bug, for no such microbe could have existed in the sterilized purlieu of Boston.

From Key West he went to Pensacola, the mother-in-law of Naval aviation, where he was commissioned and made a flight instructor. From 1918 to 1922 he was an instructor and check pilot in big twin-engined boats—F-5-1's and H-16's, designed from the Felixtowe boats of the late Commander Porte, and forerunner of the PN series built at the Naval Aircraft Factory, that Paradise for tired naval souls in Philadelphia.

Lieutenant Parker left the Navy and did exhibition flying for three years, then was commissioned in the Marine Reserve and went on active duty. He was recommended for the North Pole expedition with Byrd by the Navy and Marine Corps, and doesn't say if he went there or not. I'm under the impression that he was there. However, like all the rest of the public, I'm growing into a state of mental lapses where I'm coming to the conclusion that Byrd went to all those places absolutely alone. If Parker was one of the Lubims, Sukkiims or Ethiopians on that North Pole trip, I've forgotten. Seems to me he was engineer officer.

Now I'm back on sure ground, for I know that in 1926 Parker was senior pilot on the late lamented P. R. T. line from Philadelphia to Washington. There didn't seem to be enough sightseers who wanted to go from Philadelphia to Washington even to look into the zoo where forty-eight states send their queerest animals, so the line stopped, and with it, the bold Parker. Only for a moment, though, for almost at once we see him operations manager for Wayco Air Service, Detroit, northern oasis in this western Sahara. He took charge while the bouncing Brock and the slender Schlee were preparing for and accomplishing—all but the Pacific Ocean—their 'round-the-world flight. Then Parker spent a year flying for an advertising company, which was excellent training for what came next—the Byrd expedition to the South Pole, the movies and the lecture platform.

Lieutenant Parker was test pilot and flew the plane on the Eastern flight when Byrd discovered the great range of mountains in Marie Byrd Land. He also holds the honor of having made the first airplane flight in Antarctica, if that's any good to him. The trouble with an honor like that is that it's almost impossible to cash in on it. He can't go to a hotel and say, "I want a free room, as I'm the first man to fly in Antarctica."

They'll say, "Where's that? And what of it?"

Well, I don't imagine the Lubims, the Sukkiims or the Ethiopians who accompanied Shishak got much out of it either. I imagine all they got was the trip.

WALTER J. SHAFFER, who is flying the night air mail between Washington and New York for Eastern Air Transport and is also test pilot for the Bureau of Standards in its radio beacon experiments, spent the years after the war, from 1919 to 1926, barnstorming over the Eastern United States. For the last three years he has been eating regularly, however. And previous to that barnstorming he had been in the war, where they fed pilots every day, three times a day; but before that, in 1915 he'd been learning to fly boats at Essington, Pennsylvania, under Walter Johnson, and had flown landplanes at Sheepshead Bay Race Track until 1916. So you might say he'd eaten lightly from 1915 to 1916, eaten heartily during '17 and '18, eaten occasionally in the years 1919 to 1926, and started eating heartily again since 1927. Food, or the lack of it, has played a very important part in both aviation and literature. Literature has its novels written in a garret on three herrings and a crust of bread, but aviation comes right back with its flights made on a cup of coffee and a hot dog. I wouldn't mention this non-eating period of Shaffer's life, only he mentions it himself.

Walter J. Shaffer

He enlisted in the Lafayette Escadrille and sailed for France early in 1917, presumably in search of something to eat, which he found, together with the Croix de Guerre with three palms and the Medaille Militaire, so he could not have spent all his time eating. He trained in the French schools at Avord, Tours, Pan and Plessis Belleville for four months and then served on the front with three squadrons, all French: Nieuport 156, Morane 156, and Spad 38, the latter of which was commanded by Capt. George Madon, an ace with forty-two victories to his credit. He writes:

"Pan was an acrobatic school only. There were no dual control ships, the pupil being shown the position of the controls for certain maneuvers. He was then belted into a Nieuport with three belts, told to climb to 1,000 meters, and do his aerobatics. The tail spin class had a record of killing one man a day.

"Lieutenant David Putnam was my buddy and flying mate in all the squadrons I served with on the front, before he changed to the American Army. He shot down thirteen German planes before his death in battle. He took me into my first air fight. Twenty-five miles back of the enemy lines we found three Germans. My gun jammed on the first dive, and I found a German on my tail. Having a light Nieuport I attempted to climb out of range, climbed too steeply, went into a spin, and came out so close to the German my wheels rolled along his top wing. It's an open question which pilot was scared the most, but the battle ended right there.

"Fought in battle of Chateau Thierry. Mixed up several times with Richtofen's squadron, and once had the back of my seat shot away. In August, 1918, officially credited an enemy balloon and an airplane, which I shot down from my plane, No. 13, the same in which I later was shot down myself, in October, 1918, while attacking a German balloon near Laon. Rudder wires were shot away and gas tank riddled. Was not wounded. Purposely crashed the Spad so enemy could not use it. Expected to be bayoneted anyway if caught. Thought the crash would finish me—never a scratch! Germans did not stick me either, so I was twice pleasantly disappointed. Prisoner for two months; nearly starved to death. Escaped once, recaptured three days later. Forced to march twenty-five miles a day for three days without food. Passed out third day and placed in hospital at Namur, Belgium, where I was when the armistice was signed. Walked to Paris."

After all this, the New York-Washington run for E. A. T. must seem very tame. But imagine that bird purposely crashing his Spad so the enemy couldn't use it! I'll just add a little story along the same lines. All pilots were ordered in the event of a forced landing in enemy territory to destroy their planes. In 102 Squadron R.F.C. we had a bold aviator named Sims who dropped his bombs and was returning home when he got lost in thick weather and then had a forced landing through engine failure. He figured by elapsed time that he must be somewhere in Hunland, so just as several dark figures came rushing toward him, he set fire to his old F.E. By the light of the blazing Fe, he saw that the dark forms were those of English Tommies. He was not only on our side of the lines, but not far from the coast!

Chronology of Some of the Important 1930 Aeronautical Events

JANUARY

First prize of $100,000 in the International Safe Aircraft Competition, organized and conducted by the Daniel Guggenheim Fund for the Promotion of Aeronautics, for the aircraft which would demonstrate the greatest advance in aerodynamic safety without loss of efficiency, was awarded to the Curtiss Aeroplane and Motor Company for the Curtiss entry, the Tanager. (Jan. 6.)

William H. Bowlus, holder of the American sail-flying record, established a new American record for soaring flight of 6 hours, 19 minutes and 3 seconds at Point Loma, Calif. (Jan. 13.)

(Italy) New world's records for distance and duration for tourist planes over a closed circuit were established by Renato Donati who flew for 29 hours, 3 minutes and 9 seconds over a course between Ladispolis, Ostia, and Anzio, Italy, covering a distance of approximately 2,800 kilometers (1,740 miles). He flew a Fiat AS 1 powered with an 85-horsepower Fiat engine and carried with him as a passenger, Lieutenant Capannini. (Jan. 20.)

Miami All-American Air Races were held at the municipal airport, Miami, Fla. (Jan. 13-15.)

FEBRUARY

Second Annual New York Aviation Show, auspices Aviators' Post 743, American Legion, was held at the Grand Central Palace, New York City. (Feb. 7-15.)

Wilfred G. Moore set a new world's speed record for light airplanes carrying pilot and passenger at the Kansas City Municipal Airport. He flew an Inland Sport monoplane over a 100-kilometer course (62.14 miles) at an average speed of 126.95 miles per hour. The Inland Sport used was a two-place plane with a weight empty of less than 881 pounds and is rated in Class C for record attempts. (Feb. 12.)

International Class A Aircraft Show was held at the Coliseum, St. Louis, Mo. (Feb. 15-23.)

World's altitude record for light airplanes of 24,070 feet was established by Barney Zimmerley at Forest Park Field, St. Louis, Mo., in a Barling NB-3 powered with a Lambert 90-horsepower five-cylinder engine. (Feb. 16.)

(France.) A new world's endurance record of 18 hours, one minute and 20 seconds with a load of 1,000 kilograms (2,204.62 pounds) and a distance record of 3,275 kilometers (2,035 miles) with the same load was established by Capt. Dieudonne Coste and Lieut. Paul Codos in a flight completed at Istres, France. They flew in the Breguet *Question Mark* over a triangular course from Istres to Nimes to Narbonne to Istres. (Feb. 16.)

Lee Shoenhair set two new world's speed records of 185.452 miles per hour and 171.228 miles per hour for distances of 100 kilometers (62.14 miles) and 500 kilometers (310.7 miles) respectively, carrying a weight of 500 kilograms (1,102.5 pounds) in a flight at Jacksonville, Fla. He made five laps around a triangular course, setting the 100-kilometer record on the first lap. Shoenhair flew the *Miss Silvertown*, a Lockheed Vega. (Feb. 18.)

In a flight of four hours and ten minutes in the *Miss Silvertown* over the course at Jacksonville, Shoenhair set three new world's speed records for airplanes carrying a load of 1,000 kilograms (2,204.62 pounds). He set a record of 175.997 miles per hour for the 100-kilometer distance, 188.114 miles per hour for the 500-kilometer course, and 152.702 miles per hour for the 1,000-kilometer course; this latter record also broke the world's record for planes with 500 kilograms added weight over the 1,000-kilometer course. (Feb. 20.)

An American glider record of 9 hours, 5 minutes and 27 seconds was established by William H. Bowlus at Point Loma, Calif., using a Bowlus Sailplane. (Feb. 24.)

A world's altitude record of 30,453 feet for commercial airplanes was established by George W. Haldeman at Bellanca Field, Newcastle, Del. He used a standard Bellanca Pacemaker powered with a Wright Whirlwind 300 nine-cylinder radial engine. (Feb. 28.)

MARCH

Capt. Boris Sergievsky established a world's altitude record of 19,065 feet for seaplanes carrying a load of 2,000 kilograms (4,409.24 pounds) in a flight at North Beach, Queens, N. Y. He used a Sikorsky S-38 amphibion powered with two Pratt and Whitney Hornet B 575-horsepower radial air-cooled engines. (March 4.)

Capt. Sergievsky, flying the same ship, established at Sands Point, L. I., a new American speed record of 132 miles per hour for seaplanes carrying a load of 2,000 kilograms (4,409.24 pounds) over the 100-kilometer course. (March 5.)

(Germany.) The First International Sail-Flying Congress was held at Darmstadt. (March 8-9.)

A women's altitude record of 27,418 feet was established by Elinor Smith at Roosevelt Field, L. I., in a standard Bellanca Pacemaker powered with a Wright Whirlwind 300 engine equipped with a supercharger. (March 10.)

Flying the same plane, equipped with Townend rings and carrying the same load, with which he established an American speed record for seaplanes on March 5, Captain Sergievsky established a world's speed record of 143.7 miles per hour for seaplanes carrying a load of 2,000 kilograms over the 100-kilometer course. (March 13.)

A world's altitude record of 23,222 feet for seaplanes carrying a load of 1,000 kilograms (2,204.62 pounds) was established by Sergievsky in a Sikorsky S-38 amphibion at North Beach, Queens, N. Y. The plane was the same ship in which he had established previous altitude and speed records for seaplanes. (March 13.)

Capt. Frank M. Hawks took off at San Diego, Calif., on a transcontinental glider flight in the cabin glider *Eaglet*, towed by a Waco biplane piloted by J. D. "Duke" Jernigin, Jr. (March 20.)

A world's speed record of 142.66 miles per hour for landplanes carrying a payload of 2,000 kilograms (4,409.24 pounds) over a course of 100 kilometers was established by Pat Fleming and Glen E. Oderik at the Los Angeles Metropolitan Airport, Los Angeles, Calif., in a standard trimotor Bach airplane. (March 26.)

APRIL

A flight of approximately 750 miles from New York to Bermuda was completed by the *Pilot Radio*, a Stinson monoplane equipped with Edo floats and radio transmission and receiving apparatus. Effective radio communication and an over-night stop on the open sea marked the flight. The crew included Capt. Lewis A. Yancey, navigator and commander of the flight; Z. Bouck, radio operator; and William Alexander, pilot. (April 2.)

The third annual All-American Aircraft Show was held in the new hangar and exhibition building at the municipal airport, Detroit, Mich., sponsored by the Detroit Board of Commerce. (April 5-13.)

Capt. Frank Hawks completed at New York, N. Y., a transcontinental flight in the glider *Eaglet* towed by a Waco biplane piloted by J. D. "Duke" Jernigin, Jr. The flight required eight days. Nineteen scheduled stops were made en route. A distance of 2,860 miles from San Diego, Calif., was covered in a total of 36 hours and 47 minutes in the air. (April 6.)

(Germany.) Wilhelm Zimmerman established a world's speed record of 114.624 miles per hour in Class C for landplanes carrying a load of 5,000 kilograms (11,025 pounds) over 100 kilometers (62.14 miles); and a speed of 107.06 miles per hour over a course of 500 kilometers (310.7 miles). Zimmerman flew a Junkers G.38 over a closed circuit of 501.590 kilometers (311.688 miles) between Leipzig and Dessau on a flight of 3 hours and 2 minutes. (April 10.)

(Germany.) In Class C, second category for light planes (two-seaters weighting up to 250 kilograms or 551.25 pounds) Mrs. Margarete Fusbahn established a new altitude record of 15,137 feet at Boblingen, Württemburg. She used a Klemm L-25 powered with a 40-horsepower Salmson engine and carried Herr Fusbahn as passenger. (April 11.)

(France.) A world's distance record for seaplanes of 2,705 miles over a closed circuit in 30 hours and 25 minutes was established by Pilot Mermoz of the Compagnie Generale Aeropostale at La Ciotat, France. He used a Laté 28 plane equipped with pontoons and powered with a 600-horsepower Hispano-Suiza engine. He was accompanied by a navigator and an observer. (April 12.)

Col. Charles A. Lindbergh established a

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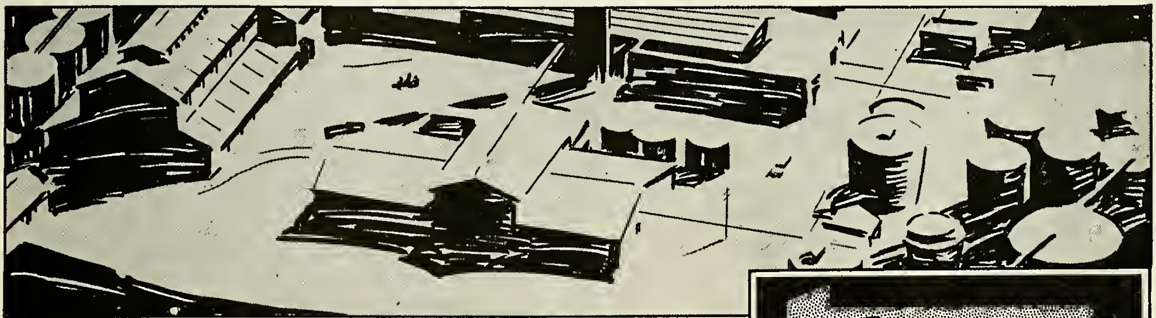
Tiona, PENNSYLVANIA



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new transcontinental record of 14 hours, 45 minutes and 32 seconds in a flight of 2,530 miles from Glendale, Calif., to Roosevelt, L. I., making one stop en route at Wichita, Kan. He used a Lockheed Sirius monoplane and was accompanied by Mrs. Lindbergh. (April 21.)

(Germany.) Waldemar Voight set a world's altitude record of 24,674 feet in Class C, first category, for light planes (two-seaters up to 882 pounds) at Darmstadt, flying an Academic Flyer Group Darmstadt powered with an Armstrong Siddeley Genet Major engine of 100 horsepower. (April 21.)

(Germany.) Rudolf Neininger, using the same plane with which Voight set a world's altitude record on April 21, established a world's speed record for planes in this class of 133.506 miles per hour over a course of 100 kilometers, accompanied by a passenger. (April 23.)

Seven-day air mail service between the United States, Buenos Aires and Montevideo over a 7,000-mile route was inaugurated by Col. Charles A. Lindbergh by a flight from Miami, Fla., to Cristobal, C. Z. (April 26.)

An unofficial world's glider endurance record of 15 hours and 13 minutes was established by Jack Barstow at Point Loma, Calif., in a Bowlus Sailplane. He carried no barograph as required by the F.A.I. to make an official record. (April 30.)

(England) A flight of 21 days total elapsed time from England to Cape Town, South Africa, and return, a distance of 18,000 miles, was completed by the Duchess of Bedford, Capt. C. D. Barnard, pilot, and Robert Little, co-pilot, in the Fokker monoplane, *Spider*. The flight required 200 hours of flying time. (April 30.)

MAY

(France.) Mlle. Lena Bernstein established a new non-refueling world's endurance record for women of 35 hours, 46 minutes and 55 seconds at Le Bourget Field, Paris, France. (May 2.)

The New York Aircraft Salon was held at Madison Square Garden, New York, N. Y., sponsored by the Aeronautical Chamber of Commerce. (May 3-10.)

(Brazil.) A flight of 1,975 miles from St. Louis, Senegal, Africa, to Natal, Brazil, preparatory to the establishment of an ocean air mail service, was completed by Jean Mermoz and two companions. The flight required 20 hours and 15 minutes. (May 13.)

The second Annual Airport Conference was held at the Hotel Statler, Buffalo, N. Y., under the auspices of the Aeronautical Chamber of Commerce. (May 14-16.)

(Spain.) The *Graf Zeppelin* landed at Seville on a flight from Friedrichshafen started the preceding day. (May 19.)

The Fourth National Technical Aeronautic Meeting of the American Society of Mechanical Engineers was held at Dayton, Ohio. (May 19-22.)

(Brazil.) The *Graf Zeppelin* arrived at Pernambuco, Brazil, after a flight of 4,000 miles from Seville, Spain, completed in 61 hours. The flight was the first made by the *Graf Zeppelin* across the South Atlantic. (May 22.)

(Australia.) Miss Amy Johnson completed a flight of 9,900 miles from Croydon Airdrome, London, England, to Darwin, Australia, in nineteen days. She used a Gipsy Moth. (May 24.)

A new world's speed record was established at San Bernardino, Calif., by Clarence O. Prest, who flew a 430-pound Prest Baby Pursuit over a 100-kilometer course in 36 minutes and 59.4 seconds, maintaining an average speed of 100.79 miles per hour. The plane was powered with a Szekely engine of 40 horsepower. The former record of 86.8 miles per hour was set by C. Fauvel of France. (May 28.)

Flying at a speed of 161.1 miles per hour, Capt. Arthur H. Page of the Marine Corps won the Curtiss Marine Trophy Race, held at the Naval Air Station, Anacostia, D. C., the fastest time ever established for this event. He flew a Curtiss Hawk seaplane powered with a water-cooled Curtiss D-12 engine. (May 31.)

JUNE

(Italy.) A world's non-refueling endurance record of 67 hours and 15 minutes was established at Monticello, Italy, by Major Umberto Maddalena and Lieut. F. Cecconi. They used a Savoia Marchetti land monoplane powered with a Fiat 22-T engine of 550 horsepower. (June 2.)

Lieut. Apollo Soucek, U. S. N., established a world's altitude record of 43,166 feet for landplanes at the Naval Air Station, Anacostia, D. C. He used a Wright Apache biplane. (June 4.)

(Germany.) The *Graf Zeppelin* landed at Friedrichshafen, Germany, completing an 18,000-mile journey to South America and the United States and return in a total of 19 days, 2 hours and 4 minutes. The flight was made in a total of 298 hours of flying time at an average speed of approximately sixty miles per hour. (June 6.)

John and Kenneth Hunter took off at Sky Harbor, Chicago, Ill., in the *City of Chicago* on a refueling endurance flight. The refueling plane *Big Ben* was piloted by Albert and Walter Hunter. Both ships were Stinson Detroiters, each powered with a Wright Whirlwind. (June 11.)

(Germany.) Flying a Junkers J 50 W powered with an 85-horsepower Armstrong-Siddeley Genet engine, Alfred Grundke established the following international records later confirmed by the F. A. I.: Distance over a closed circuit, 1,305.2 miles; speed over 100 kilometers (62.14 miles) 102.8 miles per hour; and duration, 16 hours and 29 minutes. (June 13.)

A world's altitude record of 26,368 feet for seaplanes carrying a load of 500 kilograms (1,102.5 pounds) was established by Boris Sergievsky at North Beach, Queens, N. Y. (June 15.)

A transcontinental flight from Jacksonville, Fla., to San Diego, Calif., and return was completed by William Brock and Edward Schlee in a total flying time of 30 hours, 44 minutes and 30 seconds and a total elapsed time of 31 hours and 57 minutes. (June 18.)

Dedicatory ceremonies of Randolph Field, San Antonio, Texas, "The West Point of the Air," were held. (June 20-21.)

(Irish Free State.) Wing-Commander Charles Kingsford-Smith took off from Port Marnock, Irish Free State, on a trans-Atlantic flight to New York, N. Y., in the rebuilt trimotor Fokker monoplane *Southern Cross*. He was accompanied by Evert Van Dyk, co-pilot; John W. Stannage, radio operator; and Capt. J. P. Saul, navigator. (June 23.)

Wing-Commander Charles Kingsford-Smith landed the *Southern Cross* at Harbor Grace, Newfoundland, forced down because of inclement weather on an attempted flight from Ireland to the United States. He covered a distance of 2,200 miles in 31 hours and thirty minutes, completing the third successful East-West crossing of the North Atlantic by heavier-than-air craft, and the second non-stop westward crossing by heavier-than-air craft. (June 25.)

A world's speed record for women of 174.9 miles per hour over a 64-mile course was established by Amelia Earhart at Grosse Ile Airport, Mich., in a standard Lockheed Vega. (June 25.)

The *Southern Cross* flew from Harbor Grace, Newfoundland, to Roosevelt Field, L. I., covering the distance of about 1,100 miles in 15 and one-half hours, completing the second flight by heavier-than-air craft from Europe to the United States. (June 26.)

A non-stop flight from New York to Bermuda and return was completed in the trans-Atlantic Bellanca monoplane *Columbia* which was used by Clarence Chamberlin and Charles Levine on the New York-Germany flight in 1927. The crew comprised Roger Q. Williams, pilot; Lieut. H. P. Connor, U. S. N. R., navigator; and Erroll Boyd, co-pilot. The plane left Roosevelt Field, L. I., at 5:01 a. m., and completed the flight to Bermuda and return at Curtiss Airport, Valley Stream, L. I., at 10:03 p. m. of the same day. (June 29.)

JULY

The *Southern Cross*, piloted by Kingsford-Smith took off from Roosevelt Field, L. I., on a three-day flight to the Oakland Municipal Airport, Oakland, Calif., completing a world flight via Australia and England, which Kingsford-Smith began in this ship May 31, 1928. (July 1.)

John and Kenneth Hunter landed the endurance plane *City of Chicago* at Sky Harbor, Chicago, Ill., establishing a new world's refueling endurance record of 553 hours, 41 minutes and 30 seconds. (July 4.)

The National Elimination Balloon Race for the Litchfield Trophy started at Houston, Texas. R. J. Blair and F. A. Trotter of the Goodyear-Zeppelin Corp., won with a distance of 768 miles; E. J. Hill and A. G. Schlosser, Detroit Balloon Club, second, 688 miles. (July 4.)

(England.) For the first time a woman won the King's Cup Air Race when Miss Winifred Brown finished a 750-mile race around Great Britain first among eighty-seven competitors. She flew an Avro Avian powered with a Cirrus Mark III engine. (July 5.)

(*Continued on next page*)

DOLLARS AND SENSE

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LINDBERGH FIELD SAN DIEGO CALIFORNIA

(*Continued from preceding page*)

(Switzerland.) The International Air Navigation Commission of the League of Nations assembled for the first time at Geneva to begin the formulation of a program promoting closer international coöperation in civil aviation. (July 8.)

Miss Ruth Alexander flew a Barling NB-3 monoplane to a height of 26,000 feet at San Diego, Calif., establishing a new world's altitude record for women. (July 11.)

(Germany.) Sixty planes started in the International Light Plane Tour or "Challenge Internationale de Tourisme," Berlin-Tempelhof Airport, Berlin, Germany, on a 4,700-mile tour. (July 20.)

The All-America Flying Derby, sponsored by American Cirrus Engines, Inc., started at Detroit, Mich., with eighteen planes competing in the 5,541-mile race over a route in Canada and the United States (July 21.)

Glenn H. Curtiss died at Buffalo, N. Y., (July 23.)

Chance Vought died at Southampton, L. I., (July 25.)

(Germany.) Nine planes competing in the International Light Plane Tour, crossed the finish line at Berlin-Tempelhof Airport where the contest started eight days before. (July 27.)

(England.) The British airship R-100 took off at Cardington, England, on a trans-Atlantic flight to Montreal, Canada, and return. (July 28.)

Ten of the eighteen pilots starting the All-America Flying Derby finished at Detroit, Mich. Lee Gehlbach, flying a specially built Command-Aire, won the race, averaging 145 miles per hour while in the air. (July 31.)

AUGUST

(Canada.) The British airship R-100 moored at St. Hubert Airport, Montreal, Canada, after a flight of 78 hours and 49 minutes from Cardington, England, completing the fourth lighter-than-air westward crossing of the Atlantic and establishing a speed record for this journey by airship. (Aug. 1.)

Capt. Frank Hawks flew the distance of 2,600 miles between Los Angeles, Calif. and New York City in 14 hours, 50 minutes and 43 seconds, the fastest transcontinental flight on record. He stopped en-route for refueling at Kingman, Albuquerque, Wichita, St. Louis and Columbus, for a total of one hour and 15 minutes, making his actual flying time 13 hours, 35 minutes and 43 seconds. He used the Travel Air monoplane *Texaco 13*. (Aug. 6.)

(Germany.) The International Gliding Meet was held under the auspices of the Rhoen-Rossiten Gesellschaft, East Prussia, Germany. (Aug. 9-24.)

A world's non-refueling endurance record of 22 hours, 18 minutes and 32 seconds was completed by William Atwater in a single-engined Savoia-Marchetti amphibion, taking off and landing on the water at Manhasset Bay, Port Washington, L. I. (Aug. 10.)

Capt. Boris Sergievsky established an international altitude seaplane record of 21,000 feet, carrying a load of 2,000 kilograms (4,409.24 pounds), in a flight at Bridgeport, Conn. He used a Sikorsky S-38 amphibion with the wheels removed and powered with two Pratt and Whitney supercharged 525-horsepower engines. (Aug. 11.)

(Canada.) The R-100 left Montreal on a flight to Cardington, England. (Aug. 13.)

(England.) The R-100 docked at Cardington, England, after a flight of 56 hours and 12 minutes from Montreal, Canada, completed at an average speed of 60 miles per hour. (Aug. 16.)

Completing a world's refueling endurance record of 647 hours, 28 minutes and 30 seconds, Dale "Red" Jackson and Forrest O'Brine landed the monoplane *Greater St. Louis* at Lambert-St. Louis Field, St. Louis, Mo., after 27 days in the air. (Aug. 17.)

(Germany.) Capt. Wolfgang von Gronau and a crew of three took off from the Isle of Sylt in the North Sea, northernmost German territory, on a long-distance flight which was concluded as a trans-Atlantic voyage. He was accompanied by Edward Zimmer, co-pilot; Franz Hack, mechanic; and Fritz Albrecht, radio operator. They used a Dornier Wal flying boat which was used on Amundsen's Polar flight in 1925 and by Captain Courtney on an attempted trans-Atlantic flight. (Aug. 18.)

The National Air Races were held at Curtiss-Wright Reynolds Airport, Chicago, Ill. (Aug. 23-Sept. 1.)

(Italy.) An international competition for light airplanes, known as the "Giro Aero d'Italia 1930" or Aerial Tour of Italy, was held, sponsored by the newspaper *Il Popolo d'Italia* and supervised by the Royal Aero Club of Italy. (Aug. 25-31.)

Capt. Wolfgang von Gronau and a crew of three landed their Dornier Wal flying boat in New York Harbor, completing a nine-day flight from the Isle of Sylt, a distance of 4,670 miles, in 47 hours flying time. The journey, which was the fourth westward crossing of the North Atlantic by heavier-than-air craft, was made by way of Reykjavik, Iceland, via the Faroe Islands; Ivigut, Greenland; Cartwright Bay and Queensport Harbor, Canada; and Halifax, Nova Scotia. Their flight was the first made by heavier-than-air craft from Germany to the United States. (Aug. 26.)

The Gordon Bennett International Balloon Race and Aerial Carnival was held at Cleveland, Ohio. The race was won for the second successive year by Ward T. Van Orman, representing the United States and piloting the balloon *Goodyear III*. He landed at Norfolk County, Mass., a distance of 542 miles. (Aug. 31- Sept. 1.)

SEPTEMBER

The Thompson Trophy Race was held in conjunction with the National Air Races, Chicago, Ill. Won by "Speed" Holman who flew 202 miles per hour in a Wasp Junior Laird. (Sept. 1.)

First trans-Atlantic flight from Paris to New York was completed in 37 hours and 18 minutes by Major Dieudonne Coste and Lieut. Maurice Bellonte in the Breguet sesquiplane *Question Mark*. (Sept. 2.)

(France.) Mlle. Maryse Bastie established a world's non-refueling endurance record for women of 38 hours on a flight at Paris, France. (Sept. 4.)

The National Air Tour started at Detroit, Mich., with eighteen planes competing for the Ford Reliability Trophy. (Sept. 11.)

Major Dieudonne Coste and Lieut. Maurice Bellonte took off from New York, N. Y., in the trans-Atlantic Breguet sesquiplane *Question Mark* on a twenty-eight day good will tour of the United States. (Sept. 11.)

The National Soaring Contest was held at Elmira, N. Y. An American altitude record of 3,159 feet and an endurance record of 6 hours and 48 minutes were set by Warren Eaton and Jack O'Meara respectively. (Sept. 21-Oct. 5.)

The National Air Tour ended at Detroit, Mich., with the eighteen planes which started present at the finish. Flying a Ford trimotor transport, Harry L. Russell was both first over the finish line and first in the number of points (Sept. 27.)

Daniel Guggenheim died at his home, Port Washington, L. I., (Sept. 28.)

OCTOBER

Miss Laura Ingalls landed at Los Angeles, Calif., setting a women's East-West transcontinental record of 30 hours and 27 minutes. (Oct. 8.)

(England.) Capt J. Erroll Boyd and Lieut. Harry P. Connor landed the Bellanca monoplane *Columbia* on Tresco, Sicily Isles, 27 miles from the southwestern tip of England. They had been in the air for 23 hours and 40 minutes since the take-off at Harbor Grace, Newfoundland, October 9. (Oct. 10.)

A good will air tour of the United States was completed at Curtiss Airport, Valley Stream, L. I., by Major Dieudonne Coste and Lieut. Maurice Bellonte in the trans-Atlantic plane *Question Mark*. (Oct. 10.)

Mrs. Keith Miller established a women's transcontinental East-West record of 25 hours and 40 minutes, breaking the mark established by Miss Laura Ingalls. (Oct. 16.)

Miss Laura Ingalls set a women's West-East transcontinental record of 25 hours and 35 minutes on a Los Angeles-New York flight. (Oct. 18.)

(Australia.) Lowering by more than five days the record for a flight between England and Australia, Wing-Commander Charles Kingsford-Smith landed at Port Darwin, Australia, completing a 10,000-mile flight from England in 9 days and 23 hours. He used a 125-horsepower plane (Oct. 20.)

Breaking the women's West-East coast-to-coast record established October 18 by Miss Laura Ingalls, Mrs. Keith Miller landed at Curtiss Airport, Valley Stream, L. I., after a flight from Los Angeles, completed in 21 hours and 47 minutes. (Oct. 26.)

Covering a distance of 1,000 kilometers (approximately 625 miles) in 3 hours, 46 minutes and 59 seconds at an average speed of 164.26 miles per hour, Lee Shoenhair apparently established a new world's speed record in a flight at the municipal airport, Akron, Ohio, flying the Lockheed monoplane *Miss Silvertown*. (Oct. 27.)

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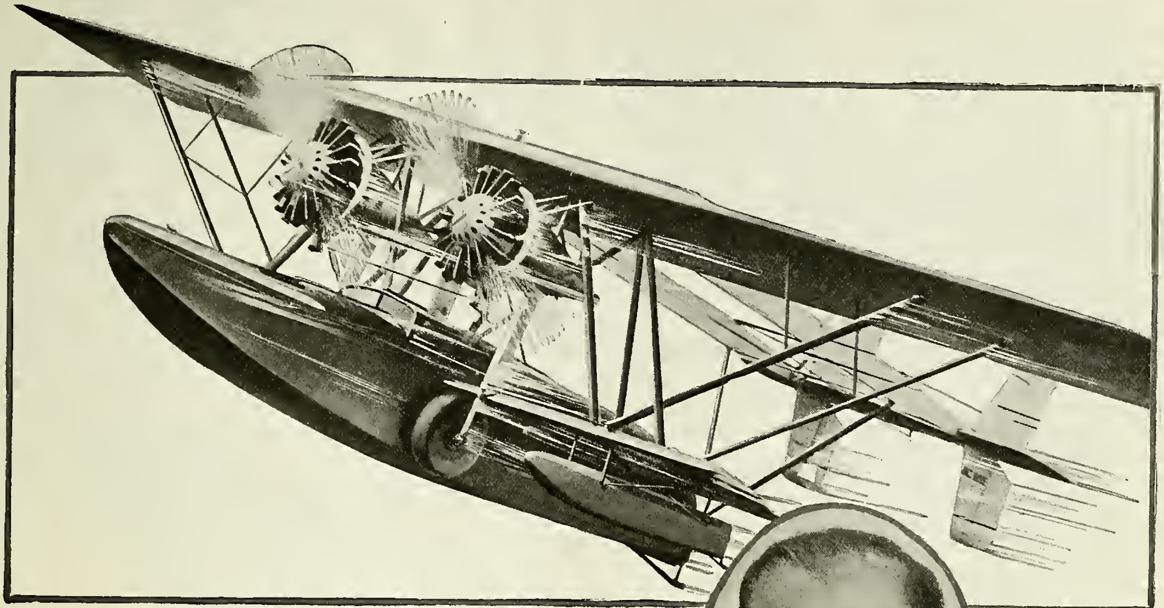

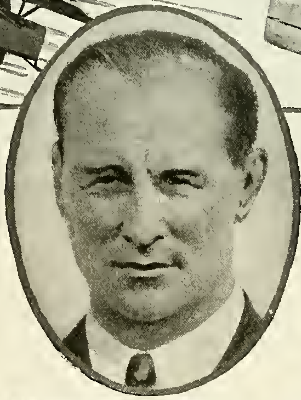

CAPTAIN BORIS SERGIEVSKY of the Sikorsky Aviation Corporation, who tested the *new* Socony Motor Oil in his Sikorsky S-38.

the new

SOCONY MOTOR OIL

proved perfected in the air by Captain Sergievsky in his record-holding Sikorsky S-38

PERFECTED . . . proved in the laboratory, we already knew that the *new* Socony Motor Oil was a great oil for airplanes. But we further proved it in the air under actual flying conditions.

Captain Boris Sergievsky, holder of the world's altitude record for amphibians, shot his Socony-lubricated, record-breaking Sikorsky S-38 up for more than four and three-quarters miles . . . 25,200 feet on a sealed barograph . . . The *new* Socony Motor Oil lubricated the ship's two Pratt & Whitney Hornet engines perfectly throughout the flight.

Because it is completely dewaxed, the *new* Socony Motor Oil is more fluid at low temperatures than any other. It maintains the proper body at all engine temperatures, giving perfect piston seal, maximum power, and minimum fuel consumption. It is refined by the new and exclusive Socony process which gives additional lubricating value and insures less wear on your engine.

Try the *new* Socony Motor Oil today.

Perfected . . . proved . . . in every way!

STANDARD OIL COMPANY OF NEW YORK

LOVELL FIELD

Chattanooga's New Municipal Airport

By R. W. Youngsteadt

NESTLED in a broad level valley in the heart of the Cumberland Mountains with many famous rises surrounding it on the distant horizon, Lovell Field, Chattanooga's new $250,000 municipal airport, affords air travelers an excellent all-season day and night landing field and terminal facilities.

Lovell Field contains 216 acres, with additional land available for future expansion, and is located seven and one-half miles from the heart of the city of Chattanooga, east of Missionary Ridge at Chickamauga, Tennessee. It is on a paved side road one-half mile off the Lee highway, which leads directly into the city. A new highway that will pass by the field is now under construction and will offer a shorter and faster route into Chattanooga.

Structures at the port include a beautiful, fire-proof administration building of modernistic, setback architectural design, combination hangar and workshop and a filling station. An airport cafe, where home cooked meals are served, is in operation in a building adjacent to the field. All buildings are finished in a cream colored stucco.

The administration building is three stories high and contains all the features of a modern air terminal. On the first floor are a waiting room, ticket office, operator's office, rest rooms, mail room, Interstate Airlines, Inc., office and telephone and telegraph stations. On the second floor is a weather bureau office, one of the best equipped in the Southeast, offering twenty-four-hour service to pilots. Also on that floor are a Department of Commerce office and a radio room, and pilots' quarters, including a lounge, observation room, emergency sleeping beds, shower and clothes lockers. The field manager's office is on the third floor commanding a clear, unobstructed view of the entire airport. On the field side of the building is a fenced-in concrete court where spectators may watch activities.

The hangar is a one-story fire-proof structure, 100 by 120 feet, with a nineteen-foot overhead clearance. It has masonry walls, built-up roof, steel columns and steel roof trusses. A workshop, 100 by 16 feet, adjoins the west side of the hangar. It is equipped to overhaul any make of ship and engine. Built onto the east side of the hangar is a boiler room for steam heating both the hangar and administration building. A concrete apron, 100 by 50 feet, extends out in front of the hangar. The ground around the administration building and hangar has been beautifully landscaped with perennials and velvet-like grass.

The shortest dimension of the landing area is 2,400 feet. There is a take-off stretch 3,300 feet long into the prevailing winds. Sixteen miles of drainage tile, dykes around the lower end of the field to hold back flood waters of a creek that runs close by, and a good stand of Bermuda grass assures pilots satisfactory landing conditions in any kind of weather. At present there is no need for improved runways, though they are being considered for future development. The Standard Oil Company has built two asphalt taxi lanes on the field, one 900 feet long on the east side parallel with the hangar and administration building, and the other 350 feet long perpendicular to the other, extending out into the field in front of the administration building. Four electric fueling stations for dispensing gasoline, oil, water and air flank the longer lane. The Standard Oil Company has spent $35,000 on its installations at the field.

Government lighting specifications for an A-1-A airport were adhered to in providing Lovell Field with equipment for night flying. White boundary lights on a series circuit outline the field at intervals of 300 feet or less. Seven best approaches are indicated with green lights, and all obstructions are clearly marked with red lights. A 24,000-watt General Electric type ALH, 180-degree beam, field floodlight provides illumination for the field when airplanes land and take off. All the buildings are floodlighted so that they may easily be seen from the air, and the name of the city on the roof of the hangar is visible at night from an altitude of 3,000 feet.

Other lighting equipment includes a ceiling light, a clear type twenty-four-inch revolving beacon, fueling lights, an illuminated wind sock and a wind T outlined in red and green neon. Lights in the hangar are equipped with vapor-proof fixtures to diminish the fire hazard.

All wires on the field are run underground in Trenchlay, and the field lighting equipment is remotely controlled from the operator's office. Electric service is delivered to the airport transformer bank over a 2,300-volt circuit by the Tennessee Power Company.

Inasmuch as the airport is beyond the range of the city water mains, a 150-foot well was drilled and a 30,000-gallon underground reservoir constructed. Water mains have been installed to the present buildings and fire plug, and extended

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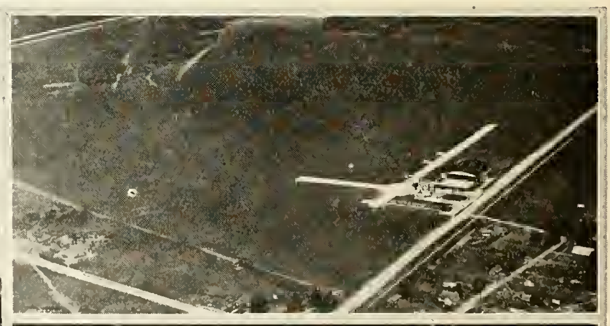

An element of modernism in the Old South: Left, an approach view of the new administration building at Lovell Field, Chattanooga, Tennessee; right, the port as seen from the air and the buildings floodlighted at night

ASPHALT for AIRPORTS

PORT COLUMBUS AIRPORT, *Columbus, Ohio, showing Asphalt landing field and runways.*

The same Field from an elevation of 2000 feet.

FOR resiliency under impact; for durability, smoothness and freedom from dust; for economy, adaptability to any needed scale of costs, and for ease of maintenance . . . Airport Engineers specify Asphalt. More than 60% of the important airports of America with improved runways and landing fields have used Asphalt as the paving, dust-laying and waterproofing medium. *Write for information.*

TYPICAL INSTALLATIONS

- Amarillo, Texas, Municipal Airport
- Central Airport, Camden, New Jersey
- Detroit, Michigan, Airport
- Fairfax Airport, Kansas City, Kansas
- Mather Field Airport, Sacramento, California (1918)
- Port Columbus Airport, Columbus, Ohio
- Saint Paul, Minnesota, Airport
- United Boeing Airport of Los Angeles and Burbank
- Valley Stream Airport, Long Island, New York

The ASPHALT INSTITUTE

A national institution not organized for profit but for constructive, educational and research activities. Representing 80% in volume of the asphalt producers in the United States and Canada.

CRYSTAL BUILDING, EAST 43rd STREET & 2nd AVENUE, NEW YORK

(*Continued from preceding page*)

to future building sites. A water softener has been installed for airplane radiator service, and city water is provided for drinking purposes.

Complete fire fighting equipment and two forty-gallon Foamite fire engines, along with the field ambulance which is a combination fire fighting and first aid job that carries four litters of the navy type, insure protection in case of fire.

The United States Government is spending approximately $200,000 at Lovell Field. It has already installed a teletype system for the weather bureau, tying in with all fields on the Chicago-St. Louis-Atlanta air mail route, and is constructing a radio beacon and complete short-wave radio station.

Operations at the present time include two mail ships during the daytime over the Nashville-Atlanta route of Interstate Airlines and two night mail ships over Interstate's Chicago-St. Louis-Atlanta route. Two flying clubs totaling 120 members are active and a third is being formed. Other services include aerial photography, aerial surveys, short hops, taxi service and cross-country flying. Three transport pilots, flying open and closed ships, are available for this service at any time.

THE AIRPORT SNAPS OUT OF IT

By Wyatt Brummitt

TRANSPORTATION, alone, is not enough. Ford discovered this modern verity and created his Model A. The railroads have discovered it, with a resultant increase in club cars, observation cars, compartment Pullmans, extra-fare trains and de luxe terminal facilities.

And now the airlines are making the discovery for themselves. It might have been assumed (as a matter of fact, it was assumed) that commercial flying had only one stock in trade—swift transportation. Theoretically, swift transportation, unadorned and otherwise strictly Jeffersonian, was sufficient to attract the business man whose time was worth much money. Provided he could save time, it was believed, the prospective air traveler might very well overlook the sketchiness of the airports, the general catch-as-catch-can atmosphere of the business and the actual discomforts of starting and finishing his flights. Such, at least, was the theory.

But the theory didn't work. As a country, America is growing air-minded. During 1929, according to Department of Commerce figures, some 3,527,000 people flew in commercial planes of all sorts. But most of these people—about 97.5 per cent —were merely joy-hoppers, sightseers or stunt relishers. It is one thing to be "air-minded" in terms of short thrillers; it is decidedly another thing to be air-minded in terms of aviation as an honest transportation service.

And so aerial transport has gone after its special problem. Fast transportation being inadquate to insure the success of commercial aviation as a business what additions were necessary?

Much of the trouble, it seems, has been on the ground. For one thing, the average of America's 1,800 active airports is still a fairly disheartening looking thing. It still has the flavor of war days when any shed large enough to take a Jenny was a hangar and when discomfort itself has a sort of prestige. At many places, prospective air travelers have been forced to await the warming-up of their plane in a draughty shed, with a hot-dog stand the only gesture toward animal comfort. And when their plane was ready, it was usually necessary to go out to it through mud, dust or cinders, dodging propellers and wondering whether or not, after all, this flying stuff was worth the candle.

Americans pay gladly for transportation and for service, but they do not enjoy paying for discomfort or inconvenience.

But a revolution in airports is under way. Drainage systems are helping to eliminate dust and mud; pavement is being put down on the take-off or landing runways; taxiways and aprons are being paved and covered gangways are being built to insure safe conduct of travelers to the door of their ship. Large fireproof hangars are appearing in steadily increasing numbers, hangars that represent a reassuring stability and efficiency in airline operation.

And airport terminal buildings are at last being given their rightful place in the sun. Architecturally, they are appropriately modern and are, naturally enough, new in design, for their function is new. Some of them, such as those to be found at Buffalo, Cleveland and Chicago are small affairs, but they serve. In them are offices for the necessary port officers, ticket offices and waiting rooms for passengers. Kansas City, Missouri, has recently completed a $60,000 air passenger station, and Fairfax Airport in Kansas City, Kansas, has an even more impressive structure. Large terminal structures are also to be found at other ports of call along the transcontinental airways. The building at the Glendale, California, port is a beautiful job architecturally, incorporating a decorative tower on top of which is the main port beacon. At United Airport, Burbank, California, the terminal might justly be termed magnificent. The city of Detroit is building a port headquarters of ambitious proportions—and Detroit's transportation ambitions have a way of being realized. Incidentally, the Detroit port has the equivalent of about five miles of standard highways in its system of concrete runways, aprons and drives. And at Ford Airport, Dearborn, there is a beautiful new hotel. Indeed, many more examples might be cited.

General Electric 2-ALH-5B floodlight

With these increasing facilities for the conduct of airport business in a neat, ship-shape manner, public interest and confidence in air transport is growing. These changes at airports, together with fare reductions, have been largely responsible for the increased total of 208,357 passengers carried the first six months of 1930. To the potential air traveler the appearance of efficiency means a good deal. But to the actual user of plane service, it means much more. It quiets the fears which still persist in the minds of many in regard to flying. And it justifies the formerly wistful hopes of those who, though convinced of the practicability of aerial transport, looked forward to a time when flying would cast off its vacant-lot spirit and become an honest, self-respecting business.

NEW FLOODLIGHTING FOR SMALL AIRPORTS

A NEW floodlight, designated as Type 2-ALH-5B by the General Electric Company, has been developed for floodlighting small airports from one point; for floodlighting larger airports, or airports with shifting wind directions, from two or more points; and for the lighting of any large area where a narrow vertical spread and a wide horizontal spread of the light are desired.

High illumination efficiency is obtained by the use of parabolic, cylindrical glass mirrors with straight-line focus, and by the use of high-efficiency Mazda lamps with concentrated filaments. The units are totally enclosed, and are both weather-proof and dust-proof. Cooling is by radiation.

The design of the mirror and the concentration of the lamp filament make the

(*Continued on next page*)

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beam angle very narrow in the vertical direction.

Two 1,500-watt, 32-volt, Type T-24 Mazda C airport floodlight lamps are placed along the focal line of the cylindrical parabolic trough mirror, which is 36 inches high and 15 inches wide. Light is conserved by having spherical mirrors in front of each lamp, returning the direct light to the large parabolic mirror and adding approximately 30 per cent to the intensity of the main beam. The optical system is enclosed on the front and two sides by heat-resisting glass; the remainder of the housing consists of sheet metal, painted with the conventional stripes of black and chrome yellow. The unit has a pipe-collar base with set screws for mounting on a four-inch pipe.

The floodlight is integrally equipped with a compensator or auto-transformer for changing the 115 volts of the distribution transformer to the recommended 32 volts. Taps are provided for 110 and 105 volts. A transformer for 230, 220 and 210-volt lines can also be supplied. The unit is suitable for remote control, and does not require an attendant to turn it on and off. The over-all dimensions are approximately two by two by four feet.

More Than 1,000,000 Passengers Carried by Planes During First Half of 1930

MORE than 1,000,000 persons in the United States rode as passengers in airplanes during the first six months of 1930, according to a recent announcement of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. This figure is obtained by combining a total of 924,800 passengers carried in miscellaneous flying operations and a total of 208,357 passengers carried on regular scheduled air transport lines, making a grand total of 1,133,157 passengers carried during the first six months.

In the survey made by the Department, the totals for domestic airlines and foreign airlines operated by American companies were separated instead of being combined as in previous studies. For the first half of 1930 the passenger traffic figure for domestic airlines totaled 185,956 and for foreign airlines, 22,401.

Prospect Airporter equipped with crane for hauling damaged plane

AIRPORT SERVICE TRUCKS

DEMAND of airports for improved equipment has been met on the part of manufacturers of auto trucks by the production of a variety of specialized trucks, designed to meet all airport needs for motive power. Trucks to serve as "portable gasoline stations," fire engines, ambulances, and wreckers for the airport, as well as combination apparatus to fill several of the various services, have been announced by leading truck manufacturers.

Refueling units have been developed fully equipped to supply not only gasoline, but air, water and oil as well. Driven by power from the truck transmission, rotary pumps or air compressors have been utilized on these mobile service stations to force the oil, water and gasoline, simultaneously if desired, into the plane tanks. Air compressors, in combination with air storage tanks, provide the "free air" of the airplane service station. In addition, some trucks provide an exhaust heater to heat the oil and water to crankcase temperature.

Other trucks in various service combinations, styled as "multi-service units," provide the airport with increased protection through a fire fighting engine, which may be converted into squad type emergency ambulance, or a traction engine to tow heavy ships.

Among the leading companies which have announced airport trucks are the Prospect Fire Engine Company, Prospect, Ohio; the Heil Company, Milwaukee, Wisconsin; and General Motors Company.

The Prospect company has developed a motor apparatus called the "Airporter," available in two types—fire and ambulance; and fire, ambulance and wrecker. This truck is built either on the company's own specially designed fire engine chassis or on standard makes of motor truck chassis. An enclosed type cab is used, equipped with hospital and surgical supplies. The body is of the squad type, built of heavy sheet steel, extra wide, extending to the outside of rear fenders. Dual wheels are used on front and rear axle.

Squad type removable seats, leather-upholstered, on each side run parallel the entire length of the body. The reverse side of the bottom of the body is also upholstered and when reversed makes, with the seats, a full width padded and upholstered deck for ambulance service. Ambulance and first aid equipment, such as stretchers, sheets and blankets, are standard equipment.

Fire fighting equipment furnished with the truck includes one ten-gallon fire extinguishing system of any practical type mounted in the body. Miscellaneous fire equipment, such as pike piles, accessory tanks of extinguishers and the like, are included.

The Airporter is provided with a disappearing or collapsible crane and is capable of a hoist or direct pull of five tons. When the crane is not in use, it remains in folded position below the floor on the chassis frame. It is elevated or lowered under its own power.

Economy and efficiency in operation are cited by the manufacturers as advantages of this "multi-service" motor apparatus.

The Heil Company of Milwaukee, Wisconsin, manufactures a "service station on wheels," thirty of which have been contracted for by the War Department. The Heil-built airplane refueling unit is fully equipped to supply air, water, oil and gasoline to planes. The water, gasoline and oil are pumped by power-driven rotary pumps, driven from the transmission of the truck. The oil and gasoline are filtered and accurately metered. Three hose-reels, each accommodating a suitable length of hose, are provided, one for water, one for oil and one for gasoline. There are no hose connections to be

(Continued on next page)

Heil "service station on wheels," used by the Army Air Corps

(*Continued from preceding page*)

made when servicing the plane, since the hose reel and hose are always directly connected into the pumping system, permitting wet hose operation.

Oil and water must be supplied to the airplane motor at crankcase temperature; this is accomplished by an exhaust heater, which transfers the heat thrown off by the truck exhaust pipe to the lubricating oil and water compartments, preheating the oil and water to the desired temperature. The respective temperatures of the oil and water are indicated by thermometers provided for that purpose.

An air compressor, in combination with an air storage tank, provides the necessary facilities for supplying air to the landing gear tires. Separate controls permit pumping oil, water and gasoline individually or simultaneously.

All parts (including pump, meters, hose reels and air tank) are enclosed in steel cabinets, fitted with doors and locks. These cabinets form an integral part of the tank assembly. A walking platform covered with anti-slip matting, is provided the full length of the tank on each side. There is also a platform on top of the tank, the latter providing easy access to the wings and motors of large ships.

The cabinets are provided with interior electric lights and reflectors, which permit servicing operations at night as well as in the daytime. A spot light and two fire extinguishers are provided in convenient locations. Chromium plated hand rails and steps add to the serviceability and appearance of the equipment.

The General Motors Company produces a "portable gas station," used by TAT-Maddux Air Lines and a number of air transport and oil companies. These stations are mounted on fast, easily maneuvered trucks and are equipped with pumps, hose reels, and tools for lubrication. Compressed air is used to feed the fuel into the tanks. An air compressor driven from the truck transmission by a direct power take-off elevates gasoline, oil and water to a height of twenty feet, needed when the fuel is taken in at the top of the plane.

Various models of General Motors Trucks for airport use

Air Mail Operations

AIR mail poundage increased during the first half of this year over the same period last year. The airlines carried 2,761,-376 pounds of air mail from January to June, 1930, as compared with 3,468,562 pounds during the first six months of 1929. The mail poundage figure for January-June, 1930, includes 3,571,956 pounds of domestic air mail and 189,420 pounds of foreign air mail.

Air express increased from 976,219 pounds, carried in the first half of 1929, to 1,145,477 pounds in the first half of 1930. Most of the express was carried on the domestic lines, which flew with 1,142,458 pounds. The foreign lines contributed 3,019 pounds to the total.

The total miles flown by scheduled air transport planes for the 1930 period was 16,902,728 of which 14,595,915 miles were on domestic lines and 2,306,813 miles on foreign lines. In the corresponding period in 1929, a total of 9,201,338 miles were flown.

The figures on scheduled airway operations for January to June, 1930, were based upon reports from thirty-eight operators and eighty-nine domestic airlines, and nine operators flying twenty-seven routes in Canada, Latin-America and Alaska.

N. A. T. Passenger Service

THE first direct all-air passenger service between Chicago and New York was to be inaugurated by National Air Transpor on Monday, December 1st, according to an announcement of Col. Paul Henderson, president, and Lester D. Seymour, vice president, respectively, of National Air Transport.

A schedule of six hours and thirty-four minutes was announced for the eastbound flight from Chicago to New York, with intermediate stops at Toledo and Cleveland. Westbound planes will make the 730-mile flight, including stops, in eight hours.

The eastern terminus of the new service will be at the Newark Airport, thirty minutes from New York City. Buses will cut out the time between the airport and New York to a minimum.

New trimotor passenger planes, capable of cruising at a speed of 125 miles per hour and traveling at a high speed of 152 miles an hour, the same type as flown by N. A. T. in its present Chicago-Toledo-Chicago passenger service, will be used on the Chicago-New York run. These planes have a capacity of eight passengers and 1,000 pounds of mail.

The present air mail-passenger service between Chicago and New York, offered by N. A. T., in conjunction with the New York Central Railroad, will not be affected by the new all-air service.

This new service will complete passenger operations over the northern transcontinental airway, the western portion of which is operated by Boeing Air Transport between Chicago and San Francisco. Transcontinental passengers leaving New York at noon will arrive in Chicago that evening, remain over night and take a Boeing Air Transport plane west the next morning at 9:30, arriving in San Francisco the following morning.

National Air Transport has been flying mail and express planes between Chicago and New York for more than three years.

THE AIR SERVICES

GENERAL FECHET REPORTS ON AIR CORPS PROGRESS

CONSIDERABLE progress in the development of the Army Air Corps was achieved during the fiscal year 1930, Major General James E. Fechet, Chief of the Air Corps, declared in his annual report made public on November 16. The third increment of the five-year program was completed successfully and the enlisted strength of the Air Corps at the close of the year was at that point authorized by the program.

The enlisted strength of the Air Corps was 12,032, including 378 Flying Cadets on June 30. Commissioned officers numbered 1,266, as compared with an authorized strength of 1,374. During the year, Air Corps Reserve Officers on extended duty numbered 197. However, in the lighter-than-air division there was a shortage of these officers, there being twenty-five engaged in lighter-than-air operations, although there are within the Air Corps ninety rated for this service.

The qualification standard of the Air Corps Reserves has been considerably increased by the revision of regulations to assure that all new appointees in the combat group are competent pilots. Many of the non-active Reserves have been transferred to the non-assignment group.

The tactical efficiency of the majority of National Guard air units was materially increased during the year by the allottment of additional service-type airplanes and by the procurement of modern type radio and photographic equipment. The amount of flying done by National Guard air units increased during the year without a fatal accident.

"During the past year," General Fechet said, "radio communication in aircraft has realized a material improvement. This has been due, in part, to the receipt of new and improved equipment. One hundred of a new aircraft radio receiver, type BC-152, were delivered during the year, and an immediate improvement in radio communication was noted. This was particularly true in observation and bombardment units.

It is now possible to obtain weather reports from every reporting station every thirty minutes day and night.

Col. Rickenbacker, Ranking Ace, Receives Congressional Medal of Honor

IN recognition of twenty-five aerial victories scored during the World War, President Hoover on November 6 presented the Congressional Medal of Honor to Col. Edward V. Rickenbacker, American "ace of aces."

President Hoover cited Col. Rickenbacker's record as an "outstanding one for skill and bravery." The citation for "conspicuous gallantry and interpedity" was read by the Chief of the Air Corps, Major General James E. Fechet, who commended Col. Rickenbacker's action on September 28, 1918, when he attacked a German squadron of seven planes while on voluntary patrol and shot down two of the enemy aircraft.

F. Trubee Davison, Assistant Secretary of War for Aeronautics, was master of ceremonies. Members of the former Ninety-fourth Aero Squadron with which the former Lieutenant Rickenbacker served, were in attendance at the presentation ceremonies.

(Above) Col. Rickenbacker, Hon. F. Trubee Davison and Maj.-Gen. James Fechet; (below) group of Air Corps pilots and Reserve officers at presentation of Medal of Honor to Col. Rickenbacker in recognition of his World War record

NAVAL AVIATION BUDGET $32,000,000

APPROPRIATIONS totaling $32,000,000 for naval aviation, including $1,500,000 for beginning work on the ZRS-5, the second of the Navy's two new super dirigibles, have been included in the Navy budget, according to a recent announcement of David S. Ingalls, Assistant Secretary of the Navy for Aeronautics. The budget will be presented to Congress in December.

The Goodyear-Zeppelin Corporation of Akron, Ohio, is constructing the ZRS-4, the first of the two dirigibles. It is expected that the ZRS-4 will be completed in April or May, 1931. Under the terms of a contract with the Goodyear company, the Navy Department is allowed thirty days from the date of completion of the ZRS-4 in which to decide upon the construction of the ZRS-5.

UNITED STATES RANKS HIGH IN AIR STRENGTH

America Listed Second to French Air Force in Plane Equipment According to Approximate Figures

A SURVEY of comparative air armaments, based on approximate estimates, shows that the United States is second to France in the number of aircraft in service at the present time, according to a report on limitation of air armaments published recently by the Foreign Policy Association, Washington, D. C. Italy, Great Britain and Japan follow in that order.

Lack of comprehensive figures makes it practically impossible to compare definitely the strength of American military and naval aviation establishment with the air forces of foreign countries. However, the aviation strength of this country ranks high in comparison with foreign nations, according to approximate figures, the only data available. According to the report, official figures are not obtainable for all countries and in the estimates of unofficial sources there are in most cases "the gravest discrepancies."

The present strength of the United States is estimated from 857 to 1,463 first line planes. On completion of the five-year program, the United States will have approximately 2,648 planes of all types. It is estimated that the United States Naval Air Service will have 1,000 "useful" planes by 1932, in addition to transport, utility and training planes; and that the Army Air Corps will have 1,800 planes on completion of the five-year program. (This number of Air Corps planes, however, includes training ships). The strength of the French air forces varies in estimation by various sources. The Air League of the British Empire lists the number of first line tactical units as 1,730 and adds 3,000 reserve ships, making a grand total for the French of

(Continued on next page)

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4,730 planes. The "Statesman's Year Book." 1930, gives the French total as 1,730 first line planes, and "All the World's Aircraft," 1929, puts the figure at 1,434, with 700 in the first reserve and 1,400 as a war reserve.

Great Britain's air strength is placed at 772 planes. The Air Ministry of the British Empire adds a reserve of 520, making a total of 1,282.

The Japanese total is placed between 372 and 572. The figures for Italy are approximately 1,640, inclusive of 800 reserve aircraft.

Aviators' Post 743 Holds Annual Armistice Night Dinner

MORE than twelve hundred war-time pilots and their guests attended the twelfth Armistice dinner of Aviators' Post 743 of the American Legion, held at the Hotel Commodore, New York City, November 11, in celebration of the ending of the World War on November 11, 1918.

Among the guests invited to attend the celebration were the following: Col. J. H. Howard, commanding officer of Mitchel Field; Maj. George Vaughan, commanding the Twenty-seventh Division, New York National Guard; Col. Peter J. Brady, chairman of Mayor Walker's Committee on Airports and Aviation; Lieut. C. J. Kenny, air officer of the Second Corps Area, Reserve Section; Frank A. Tichenor, publisher of AERO DIGEST; Maj. William Ord Ryan, Air Corps; and Representative Fiorello H. La Guardia, formerly a major of the U. S. Air Corps, A. E. F.

Those in attendance also included Elliott White Springs, Clayton Knight, Charles S. "Casey" Jones, vice president of the Curtiss-Wright Corporation, and Joseph M. Mellon, Maj. E. H. Brainard, J. A. B. Smith, and Charles W. Loos, all officials of the Curtiss-Wright Corporation.

Missouri National Guard Air Unit Plans Program of Cross-Country Night Flying

A PROGRAM of training in night flying has been undertaken by the Thirty-fifth Division Aviation, Missouri National Guard, operating at Lambert-St. Louis Field, St. Louis, Mo. The night flying activities are in preparation for a number of cross-country flights to various towns throughout Missouri which will be made at night next spring.

The night flying program is a continuance of the maneuver conducted last summer when planes of the unit which was then encamped at Fort Riley, Kans., during the period of active training, flew to Camp Clark, Nevada, Mo., where a majority of the Missouri National Guard units were encamped, and simulated a night attack by enemy planes. In these maneuvers, the National Guard antiaircraft units, consisting of machine gun and artillery batteries and a searchlight, cooperated with the ground forces, attempting to locate the planes and get their range before the aircraft were in position to drop imaginary bombs.

Similar maneuvers will be held in the spring when the aviation unit will fly planes at night over a number of towns where antiaircraft units are located. Until these maneuvers are held, however, the aviation unit will make a number of cross-country flights at night every week during the winter for training in navigation, radio communication, observation and aerial photography.

Approve Contracts for New Air Corps Equipment

TWO contracts for new equipment for the Air Corps, involving $235,209.07, have been approved by F. Trubee Davison, Assistant Secretary of War for Aeronautics, according to a recent announcement of the War Department.

One contract, amounting to $214,892.38, was awarded the Wright Aeronautical Corporation of Paterson, N. J., for forty Wright air-cooled Cyclone engines, Model R-1750-P, with spare parts. Twenty of these engines will each be installed in a Fokker single-engined cargo type plane. The remainder will be used for spares.

The Detroit Aircraft Corporation, Detroit, Mich., received a contract for a Detroit Lockheed single-engined transport plane, at a cost of $20,316.69. This plane will be equipped with an air-cooled Pratt and Whitney Wasp engine, Model SR-1340-E, and will be provided with an improved landing gear. This contract was awarded for the purpose of continuing service tests on a transport plane of this type.

Mason M. Patrick Trophy Race at Fort Crockett, Texas

THE Major General Mason M. Patrick Trophy Race was to be held at the flying field of the Third Attack Group, Army Air Corps, Fort Crockett, Texas, November 22. Eighteen pilots flying Curtiss Falcons were entered in the race held over a ten-mile course for a total distance of sixty miles. In the race this year, the race committee permitted competing planes to carry passengers.

Report New Secret Sperry Fuse for Anti-Aircraft Fire Unusual Success

EXPERIMENTS with antiaircraft fire in which tests of a new fuse resulted in extremely satisfactory results were reported completed early in November by Army officers at the Aberdeen Proving Ground. The fuse, details of which remain secret, is the invention of Capt. T. B. Doe, vice president of the Sperry Gyroscope Company, Brooklyn, N. Y., and head of Eastern Air Transport Corporation, an affiliated company which operates the New York-Miami air mail route.

It was reported, however, that the new fuse is entirely different from fuses now used in antiaircraft fire. These fall into two classes, the powder time train and the clock fuse. The Sperry fuse is believed to involve the principle of the gyroscope in some manner.

TWENTY YEARS OF NAVAL AVIATION

THE twentieth anniversary of aviation as a unit of naval operations occurred November 14. On that date, twenty years before, Eugene Ely, an employee of the late Glenn Curtiss, successfully flew a landplane from a platform on the bow of the U. S. S. *Birmingham* at Hampton Roads, Va., the first demonstration of the use of aircraft with a man-of-war.

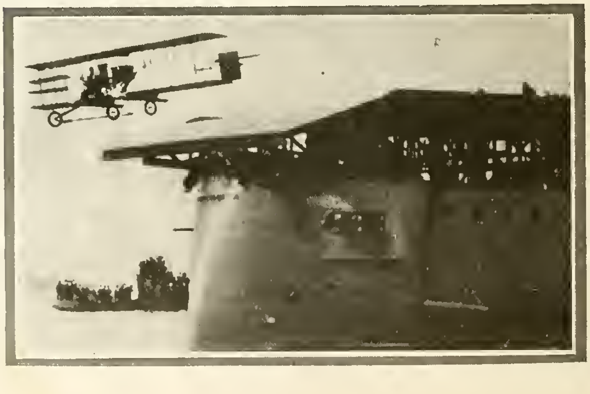
This test, however, was not taken as a final proof of the practicability of the operation of heavier-than-air craft from the deck of a surface vessel. Not until a plane had been landed on the deck of a warship would the operation of aircraft in conjunction with a surface ship be considered practical. Two months later, on January 18, 1911, Ely successfully flew to the deck of the U. S. S. *Pennsylvania* lying in the harbor at San Francisco, Calif.

After these tests had been successfully made, no funds were available to pay for aviation instruction in the Navy Department. Mr. Curtiss offered to teach several officers to fly. His offer was accepted and Lieut. T. G. Ellyson was ordered out for aviation training.

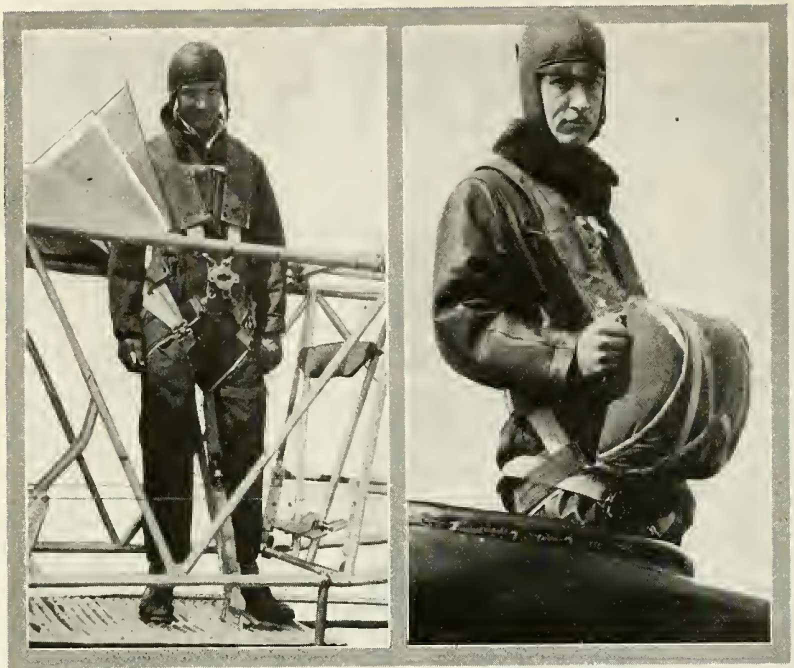
Mr. Curtiss and Lieut. Ellyson worked on a hydroplane attachment to permit water landings and take-offs. The final demonstration was made on January 26, 1911, when Mr. Curtiss flew from the water at San Diego, Calif., landed alongside the *Pennsylvania,* his plane was hoisted aboard, subsequently lowered to the water again, and flown back to the San Diego base.

These demonstrations centered the interest of the Navy Department on the practical uses of aviation in conjunction with the operations of the fleet, and the first appropriation of $25,000 for navy aeronautical experiments was passed with the 1911-1912 naval appropriation act.

The Navy Department now has three aircraft carriers and recently contracted for the construction of a fourth, the latter being the first built as a carrier.



Eugene Ely flying a Curtiss biplane from the deck of the U. S. S. Pennsylvania in the harbor at San Francisco, California.



Left, parachute harness unattached from 'chute; right, parachute attached in position

TRIANGLE QUICK-ATTACHABLE PARACHUTE

THE Triangle Quick-Attachable Parachute was designed by Major E. L. Hoffman, who, in 1927 received the Collier Trophy for developing the U. S. Army service parachute. The Quick-Attachable Parachute, made by the Triangle Parachute Company of Cincinnati, Ohio, is designed to serve the requirements of fliers who move about in the plane in carrying out their work—such as gunners, photographers and observers on lighter-than-air craft who cannot conveniently wear a 'chute at all times. This new parachute development is also adaptable for use by those who, because of cramped cabins or inadequate seat room, cannot comfortably wear a parachute.

The flier wears the harness only while he carries out his various duties. When emergency arises, he seizes the chute which is attached to the frame of the cockpit or cabin, attaches the pack to the harness and gives the pack a quarter turn. The entire operation takes less than two seconds. The mechanism is so designed that the flier can see it lock, hear it lock and feel it lock.

The "Monkey-Tail" belt shown in the accompanying illustration is a new development to hold the flier securely in the cockpit, no matter at what angle the ship is flying. Its strength is more than 2,000 pounds. It gives him complete freedom of motion. It is used in conjunction with the Triangle Quick-Attachable pack where the wearer must operate in an open cockpit. When emergency arises, all the flier does is grasp the Quick-Attachable chute, snap it on, push down on the collar opening the jaws of the "Monkey-Tail" belt release device, and jump.

The metal fitting is made of stainless, non-magnetic steel so as not to affect the compass. It has been successfully drop-tested with 1,500 pounds of lead. The pack remains in place when the chute is opening.

When the chute opens, the jumper descends at a slight angle off of vertical—suspended from a point just above center of gravity. By grasping the suspension lines, he can hold himself in a vertical position to land on his feet if he so desires.

A "BLAST REDUCER," designed to reduce danger to aircraft and personnel as well as noise in the operation of airplane catapaults used on battleships and cruisers, has been developed by the Bureau of Aeronautics, Navy Department. The device does not incorporate any changes in the principles of catapault operation or design but is intended as a refinment and development of airplane catapaults.

The first blast reducer will be installed on the powder catapaults of the light cruiser *Salt Lake City*. In the future all new catapaults will have this device incorporated in their construction.

[C. MORRIS]

LIEUT. GEN. WERNER VON BLOMBERG and Col. Erich Kuhlenthal of the German army are inspecting training methods of the Air Corps at Brooks Field, San Antonio, Texas. Capt. Gern von Masson of the German army has been detailed to the United States Army for a period of one year and is taking a primary flying course at Brooks Field to study training methods in detail.

NAVY WILL BUILD LARGEST BLIMP TO EVOLVE NEW FUEL

CONTRACT for the construction of the largest non-rigid airship ever built in this country has been signed by the Navy Department which will use the airship to develop a fuel gas to replace gasoline. Completion of the aircraft is scheduled in about six months. The envelope is being built by the Goodyear-Zeppelin Corporation, Akron, Ohio, and the car is being constructed at the Naval Aircraft Factory, Philadelphia. Pa.

The airship will have a gas capacity of 320,000 cubic feet and will be 220 feet in length and fifty-four feet in diameter. The car will accommodate six persons. The speed will be fifty knots and the range 2,000 nautical miles.

The Navy Department has long sought a fuel gas of the same density as air because such a gas eliminates the necessity for water recovery which is required to maintain equilibrium and conserve the valuable helium lifting gas.

Gasoline will be carried in special emergency tanks but the craft will be propelled whenever possible with gas.

The fuel gas will be contained in a specially built gas cell inside the envelope near the bottom. As the cell deflates with the loss of fuel, air will be sucked in to maintain its shape. With a gas of the same density as air, it will not be necessary to load down the ship with apparatus to recover water from the exhaust, a method employed on the *Los Angeles;* and air instead of helium will be valved off to maintain equilibrium.

Annual Competition for Mitchell Trophy Scheduled at Selfridge Field

COMPETITION for the John L. Mitchell Trophy was to be held at Selfridge Field, Mich., November 22, according to a recent announcement of the War Department. This event, a speed contest for pursuit ships, is an annual event and is participated in by members of the First Pursuit Group of the Air Corps, the winner receiving the Mitchell Trophy which was donated by Col. William Mitchell, formerly of the Air Corps, in memory of his brother who was killed in the World War.

TWENTY-TWO officers of the United States Army Air Corps Engineering School at Wright Field, Dayton, Ohio, recently flew in formation to Akron, Ohio, where they were guests of the B. F. Goodrich Rubber Company for a day.

AN aerial survey of Porto Rico will be started on or around December 1, according to a recent announcement of the Navy Department. The project is expected to require approximately ten weeks to complete, and will be made for the purpose of aiding in a soil survey undertaken by the U. S. Department of Agriculture at the request of the Porto Rican government.

Three amphibions based aboard the U. S. S. *Hannibal* will be used.

AERONAUTICAL INDUSTRY

CONFERENCE ON UNIFORM LAWS

A CONFERENCE in the interest of further uniformity of Federal, State and municipal air laws, regulations and practices is scheduled to be held December 16-17 at Washington, D. C. The meeting will be known as the National Conference on Uniform Aeronautic Regulatory Laws and will be sponsored by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The aircraft industry will be represented by delegates appointed by the U. S. Chamber of Commerce, the Aeronautical Chamber of Commerce and the National Aeronautic Association.

One of the most important factors contributing to the development of air commerce is uniformity throughout the country in regulatory air laws, Robert P. Lamont, Secretary of Commerce, said recently in announcing the conference. Substantial progress has already been made in the matter of uniform air laws by coöperation between the various states and the Department of Commerce, Mr. Lamont said, but a number of important things remain to be accomplished. He has extended an invitation to the governors of the forty-eight states to send two representatives to the conference.

The program of the conference will include five fundamental subjects as follows:

Uniform basic regulatory state air law.

Adoption of Federal air traffic rules by the states for purposes of local enforcement.

Methods of local enforcement.

State enabling acts for airport acquisition and control.

Importance of uniform airport field rules.

Curtiss-Wright Flying Service Bans Racing in Commercial Planes

A BAN on the use of its commercial planes in airplane races was announced recently by the Curtiss-Wright Flying Service. Maj. E. H. Brainard, president of the company, said, however, that the organization did not disapprove in racing of planes built for that purpose.

Declaring that his organization "is in business to provide flying instruction and airplane transportation," and that "racing has no connection with the commercial operation of airplanes," Major Brainard issued the following memorandum to all personnel under him:

"After carefully considering the expenses, rewards and risks involved in racing it has been decided that this organization will not participate in any airplane races."

Curtiss-Wright Holds Air Shows for Benefit of Unemployed

TO raise funds to aid unemployed, Maj. E. H. Brainard, president of the Curtiss-Wright Flying Service, last month issued an order to his airport managers throughout the country designating Sunday, November 30, as Unemployment Relief Day. He instructed them to stage air shows on that date, the entire proceeds of which are to be turned over to local relief agencies for the benefit of those in need. The Curtiss-Wright Flying Service bore all expenses and all the funds realized through the shows were handled by the relief organizations which took over the facilities at the different bases for the day.

Prospective Purchasers of Aircraft and Flying Courses May Handle Controls

A NEW policy which permits prospective purchasers of approved type aircraft and prospective students of Approved Flying Schools to handle the controls of aircraft on limited demonstration flights subject to certain conditions, has been adopted by the Aeronautics Branch of the Department of Commerce, according to a recent announcement of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

This policy makes it permissible for transport pilots employed regularly by manufacturers, distributors or dealers of aircraft approved by the Department of Commerce as to airworthiness, to demonstrate the flying characteristics of aircraft to prospective purchasers by permitting them to handle the controls while in flight. In addition, the policy applies to transport pilots holding Flying Instructors Ratings and regularly employed by flying schools holding an Approved School Certificate; such pilots may demonstrate the operation of the aircraft to prospective students by permitting them to handle the controls while in flight. All such flights shall be limited in character. The demonstration flights shall be given to the prospective purchaser or student without charge.

Henderson Heads N. A. T.

COLONEL PAUL HENDERSON, formerly vice president of National Air Transport, has been elected president of the company by the board of directors. Colonel Henderson, formerly Second Assistant Postmaster General, was instrumental in the inauguration of night flying air mail service.

Boynton Sets New Junior Coast-to-Coast Flight Records

STANLEY BOYNTON, eighteen years old, completed a round trip transcontinental flight at Scarboro Airport, Rockland, Me., November 9, claiming two new junior coast-to-coast records. Boynton took off from the airport at Rockland, October 27 on a flight to Los Angeles, Calif., and return. He used a Cessna monoplane.

Boynton completed the flight from Los Angeles in twenty hours and twenty-nine minutes, exceeding by three hours and twenty-four minutes the record set by Robert Buck on a Los Angeles-New York flight. Boynton established on the flight to Los Angeles a new junior transcontinental East-West record of twenty-three hours and fifty-six minutes.

To Make Aerial Good Will Trade Tour Of Latin America

THE Greater Miami Airport Association has appointed a special committee on Foreign Trade Relations to coöperate with other Miami civic organizations to further the city as a distribution point of aircraft and aircraft supplies for the West Indies and Central America.

One or two members of this committee will accompany a good will trade tour to be made early in the winter. This tour will be made by airplane and will touch the majority of these countries.

Dr. Munk Lecturing on Aerodynamics

DR. MAX M. Munk, aeronautical engineer and Technical Editor of AERO DIGEST, is giving a series of lectures on aerodynamics at the Catholic University, Washington, D. C.

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COL. YOUNG REVIEWS PROGRESS IN AVIATION

THE year's progress in civil aeronautics has been marked particularly by continued development of scheduled air transportation of mail, passengers and express, according to the annual report of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, to the Secretary of Commerce, recently made public.

"The passenger air transport lines are constantly making inroads into that large group of people who could travel by air but for one reason or other have elected to remain with surface transportation," the report says. "Those air lines that render a service clearly advantageous in time over other means of travel or which advantageously augment surface transportation are doing a substantial business, and the tendency points to continued increase."

Although progress in the manufacture and sale of aircraft for miscellaneous use did not continue so rapidly in the last six or eight months of the fiscal year ended June 30, 1930, as during the fore part of the year, this was not regarded as being necessarily discouraging.

"Manufacturers of aircraft," the report says, "who are just as skilled in the principles of business economics as they are in designing, constructing and flying aircraft, are paying strict attention to the needs and desires of an intelligent and discriminating aircraft market. They are making every effort to design and produce aircraft which their experience and studies have indicated are what the public wants. At the same time they are projecting plans continually on new developments, new designs, new features, in an effort to keep in the van of public desire."

Under its program of airways development, the Aeronautics Branch during the last fiscal year lighted 3,321 miles of airways, established and lighted fifty-six intermediate landing fields, and installed and operated 218 standard revolving beacon lights. Five thousand six hundred and fifty miles of airways were equipped with automatic telegraph-typewriter circuits and thirteen radio broadcasting stations were placed in operation. Two radio range beacons also were placed in operation.

At the close of the fiscal year there were 13,500 miles of lighted airways in operation, with 319 intermediate fields, 1,477 airways beacons, 303 airway weather-reporting stations, thirty-five airway radio communication stations and nine radio range beacons. Twenty-seven more radio range beacons were practically completed but were not in service operation. In addition, there were under contract, with the work of installation in various stages of completion, 1,728 miles of airways on which are being established thirty-six intermediate fields and 223 airway beacon lights.

Funds available from current appropriations have been allocated to provide more of these facilities. During the current fiscal year, 3,000 miles of airways will be lighted, thirty-three additional radio range beacon stations will be established, 2,800 miles of automatic telegraph-typewriter circuits will be placed in operation and twenty radio communication stations will be installed.

Looking to the future in air transportation, Mr. Young's report says, "When the provisions of the Watres Air Mail Act are given full force and effect, this legislation will have two outstanding, stimulating features on the industry and also will be beneficial to the public: First, air mail will be extended to various parts of the country not now being served, by the utilization of existing air passenger transport lines; and second, it will assist materially in the establishment of a more comprehensive passenger service throughout the nation by placing present air mail carriers in the passenger-transportation business."

AIRCRAFT PRODUCTION

2,154 Civil and 556 Military Aircraft Manufactured in First Nine Months

AIRPLANES manufactured in the United States for civil use in the first nine months of 1930 totaled 2,154, according to an estimate recently announced by the Aeronautics Branch of the Department of Commerce. In addition to aircraft manufactured for civil use, 556 military aircraft were delivered to the Army Air Corps and Navy Department during this period, making the total estimated production 2,710 aircraft. Of the aircraft manufactured for civil use, 198 were exported.

The estimate is based on a record of Department of Commerce licenses, identifications and reports as of October 1 for aircraft manufactured since January 1, 1930.

Airplanes for civil use were produced by 296 companies or individuals. Thirty-eight companies built more than ten aircraft each, or 81.03 per cent of the total manufactured for domestic commercial use. Three companies built more than 100 planes, six between fifty and 100, fourteen between twenty and fifty and fifteen between ten and twenty. Of the total planes built for commercial use, 11.56 per cent were manufactured by 226 companies or individuals building only one airplane each.

AS a direct result of the successful development of the new Ford high-speed, trimotor transport plane, the Ford airplane factory has been placed on a twenty-four-hour a day working schedule, according to a report of W. B. Mayo, head of the Airplane Division, Ford Motor Company.

Detroit Aircraft Reports Record Sales

THE Detroit Aircraft Corporation recently reported gross sales in October of nineteen airplanes having a value of $166,-110. This is the largest amount of business ever booked by the company in a thirty-day period, and is the fourth successive month in which sales have exceeded any previous month in the history of the company.

REPORT OF ESTIMATED AIRPLANE PRODUCTION FIRST NINE MONTHS 1930
Based on Department of Commerce Licenses, Identifications, Reports

Monoplanes	
Open-Cockpit (landplane)	
One-place	269
Two-place	141
Three-place	35
Total open	445
Cabin (landplane)	
One-place	1
Two-place	95
Three-place	25
Four-place	239
Five-place	3
Six-place	52(1)
Seven to ten-place	32(2)
Over ten-place	21(3)
Total cabin	468
Miscellaneous	
Flying boats	6(4)
Convertibles	9
Amphibions	17(5)
Total monoplanes	945
Biplanes	
Open-Cockpit (landplane)	
One-place	26
Two-place	313
Three-place	502
Five-place	5
Total open	846
Cabin (landplane)	
Three-place	1
Four-place	2
Five-place	6
Six-place	5
Seven-place	2
Eight-place	1
Total cabin	17
Miscellaneous	
Flying boats	18
Convertibles	50
Amphibions	56(6)
Total biplanes	987
Planes manufactured for experimental purposes for which complete information is not available	24(1)
Military airplane deliveries	556
Airplanes exported	198(7)
Grand total	2,710

Note: (1) 1 multi-engine plane; (2) 6 multi-engine planes; (3) 20 multi-engine planes; (4) 5 multi-engine planes; (5) 2 multi-engine planes; (6) 10 multi-engine planes; (7) does not include planes manufactured during 1929 that were exported during first nine months of 1930.

TRAFFIC INCREASE IN AIR TRANSPORT

MORE passengers were carried by scheduled air transport lines of the United States during the first six months of this year than during the entire calendar year 1929, according to a recent announcement of Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. A survey of scheduled airway operations for the period from January to June, 1930, completed by the Aeronautics Branch of the Department of Commerce, shows that do-

mestic and foreign air lines, American operated, carried 208,357 passengers during this period; 3,761,376 pounds of air mail and 1,145,477 pounds of express.

The total number of passengers carried on the scheduled air lines in the first six months of 1930 represents a four-fold increase over the number carried in the corresponding period of 1929.

Direct comparisons are made between the first six-month or between the last six-month periods of two calendar years, according to Colonel Young, as flying conditions are more favorable during the last half of the year, this fact usually being reflected in the totals. The number of passengers carried in the first half of 1930 exceeded by 87,425 the number of passengers carried during the last six months of 1929. The number of passengers flown during the entire year of 1929 totaled 173,405.

SAFETY IN SCHEDULED AERIAL TRANSPORT

THERE has been a three-fold increase in the number of miles flown per fatal accident in scheduled air transport operations, and the miles flown per accident of any kind in scheduled flying has more than doubled.

This increase in the safety of scheduled flying operations is indicated in the semi-annual report of aircraft accidents made public recently by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The report, which covers the first half of 1930, shows that there was a slight increase in the number of miles flown for each accident in civil aeronautics in the United States as compared with the corresponding period in 1929.

During the first six months of this year, a total of 68,669,928 miles was flown by civil aircraft in scheduled and miscellaneous flying, an increase of approximately 12,500,000 miles over the same period in 1929.

The causes of accidents are divided into five major classifications: personnel, power plant failures, airplane failures, miscellaneous and undetermined causes.

The largest percentage of accidents was attributed to personnel, the total being 57.14 per cent; miscellaneous was second with 17.65 per cent; power plant failures, 15.02 per cent; airplane failures, 8.78 per cent; and undetermined, 1.41 per cent (the smallest for this classification since these statistics have been compiled).

Scheduled air transport includes those operations in which aircraft carry passengers, mail and express over fixed routes at regular intervals. Miscellaneous operations include experimental, exhibition, industrial, student instruction and pleasure flying.

A table of aircraft accidents in the first half of 1930 and 1929 follows:

	January-June 1930	*January-June 1929*
ALL KINDS OF FLYING		
Total miles flown	68,669,928	56,201,338
Fatal accidents	150	127
Miles flown per fatal accident	457,800	442,530
Total accidents (fatal, non-fatal and non-injuries)	930	774
Miles flown per accident	73,839	72,612
SCHEDULED AIR TRANSPORT		
Total miles flown	16,902,728	9,201,338
Fatal accidents	6	9
Miles flown per fatal accident	2,817,121	1,022,371
Total accidents (fatal, non-fatal and non-injuries)	44	61
Miles flown per accident	384,152	150,842
MISCELLANEOUS OPERATIONS		
Total miles flown	51,767,200	47,000,000
Fatal accidents	144	118
Miles flown per fatal accident	359,494	398,305
Total accidents (fatal, non-fatal and non-injuries)	886	713
Miles flown per accident	58,427	65,919

F. A. I. Recognizes Prest World's Record

OFFICIAL homolgation of the world's speed record of 100.79 miles per hour for 100 kilometers, established by Clarence O. Prest May 28 at San Bernardino, Calif., has been announced by the F. A. I., and the record has been recognized as an international one. Prest used a Prest "Baby Pursuit" monoplane. The former record was eighty-six miles per hour for planes of the same class.

Lieutenant Hinton and the Fairchild plane in which he will make Exchange Club Air Tour

HINTON STARTS AIR TOUR SPONSORED BY THE EXCHANGE CLUB

SPONSORED by the National Exchange Club, Lieut. Walter Hinton began on November 8 an aerial tour of the United States, demonstrating the reliability of aircraft and the practicability of using aircraft on such a flight. Lieutenant Hinton will address members of the Exchange club and the general public, promoting interest in aviation and stressing particularly the advantages of scheduled air commercial operations in the transport of passengers, mail and express.

On the tour, Lieutenant Hinton will visit 800 towns and cities throughout the country where Exchange clubs are located. He will serve as an aviation counselor, discussing the problems of establishing airports with members of the club and pointing out the benefits to their city of a properly equipped airport. To the merchants and business men he will submit data on air transport operations and its value to them in carrying air mail and freight, promoting air travel generally. Lectures will be given to junior organizations on the aviation industry and its opportunities for a career.

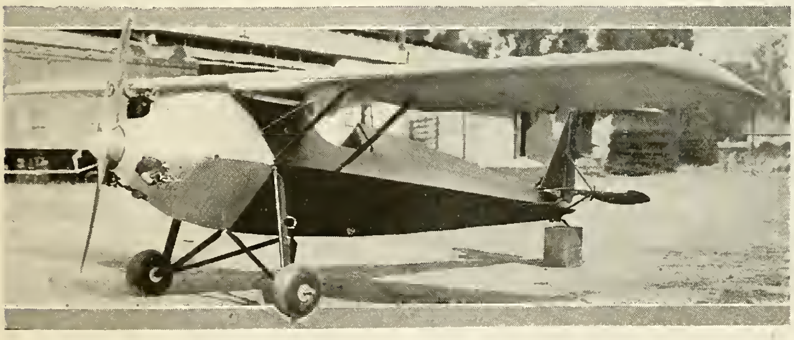
The tour is primarily an Exchange club project but efforts will be made to coordinate the efforts of members with local civic organizations in developing aviation projects. Lieutenant Hinton will visit three or four cities a week, traveling through the South and West during the Winter and the Middle-West and East during the spring.

He will use a Fairchild five-passenger plane powered with a Wright J-5 engine, which was recently purchased by the Exchange Club.

Announces Net Income of U.A.T.C.

UNITED Aircraft & Transport Corporation reports net income for the third quarter of $1,149,614.19 after providing for taxes, depreciation and minority interest. This is in comparison with a net income of $900,391.41 in the first quarter and $1,202,140.17 in the second quarter, making a total of $3,252,145.77 for the first nine months of the current year.

THE ten-millionth pound of freight carried by airplane was delivered recently by the Ford Air Lines, established by the Ford Motor Company in April, 1925, to transport parts of the Ford car and other supplies between the company's main plant at Dearborn, Mich., and its branch at Chicago.



Prest Baby Pursuit monoplane which set a world's speed record of 100.79 miles per hour

NEW YORK-HAVANA-RETURN RECORDS SET BY HAWKS

CAPTAIN FRANK M. HAWKS last month established a new record for a flight from New York to Havana, Cuba, and set a new mark for the return journey on a flight made a few days later.

Nine hours and twenty-one minutes after leaving Curtiss Airport, Valley Stream, L. I., Captain Hawks set his Travel Air Mystery S monoplane down at the airport, Havana, Cuba. He took off at 8:50 a.m., November 6, and completed the flight at Havana at 6:11 p.m., stopping en route at Jacksonville, Fla., for twenty-three minutes and at Miami, Fla., for twenty minutes. He averaged 182 miles per hour on the trip. The previous record of fourteen hours, a non-stop flight, was made March 5, 1928, by the late Wilmer Stultz, who carried Charles A. Levine and Miss Mabel Boll as passengers.

On November 9, Captain Hawks flew from Havana to Roosevelt Field, L. I., in eight hours and forty-four minutes, cutting thirty-eight minutes from the record he established November 6 when he flew the same plane from New York to Havana. He took off at 7:34 a.m., and flew to Miami in one hour and thirty-three minutes. He took off after a short stop and flew to Charlotte, N. C., three hours and forty minutes after leaving Miami. After a stop of twenty-six minutes, Captain Hawks took off on the last leg of his 1,400-mile flight, covering the 600 miles from Charlotte in two hours and fifty minutes. His average speed was 190 miles per hour and the last leg was flown at an average speed of 210 miles per hour.

Speed Record Made by Manning in Ford Trimotor Recognized by F. A. I.

THE new world's record of 164.4319 miles per hour made September 29 by Leroy Manning, chief pilot of the Ford Motor Company, in a new high-speed Ford trimotor all-metal monoplane, over a 100-kilometer closed course and carrying a 2,000-kilogram (4,409-pound) load has been accepted as official by the F. A. I.

The flight was made over a course extending from Ford Airport, Dearborn, Mich., to a point near Ann Arbor, Mich., and return. The 62.3-mile course was covered in 22 minutes and 40.4 seconds. The new record exceeds by almost twenty-two miles per hour the former record of 142.66 miles per hour made by W. J. Fleming in a Bach trimotor transport at Los Angeles in March, 1930.

93,805 Physical Examinations Given

A TOTAL of 93,805 physical examinations for Department of Commerce pilot licenses since the organization of the branch in 1926, had been conducted by authorized medical examiners of the Aeronautics Branch of the Department of Commerce on September 30.

Examinations made by physicians of the Aeronautics Branch are divided into two types: Those for transport and limited commercial license and those for private license.

ANNUAL MIAMI AIR RACES SCHEDULED

THE Third Annual Miami All-American Air Races will be held January 8-10, 1931, at the Miami Municipal Airport, Miami, Fla. The program of activities will include aerial competitive events and exhibitions and prizes totaling $7,500 will be awarded the winners of the various contests. Race horse starts, inaugurated for the first time in the Miami All-American races at the second annual meet held January, 1930, will be used in addition to a number of innovations designed to facilitate efficiency in the handling of the meet.

The race committee has been working on plans for the meet since early spring and a minimum of 200 entries is expected. The entry fee will be one dollar and entries close two days before the races. In accordance with the policy of making these races a non-profitable event, the management announces arrangements to provide hotel accommodations at the rate of one dollar per day to visiting pilots and mechanics licensed by the Department of Commerce.

The races will be handled by the ten race committees, consisting of over three hundred business men and aviators of Miami, who were responsible for the previous races. These committees are under the charge of Andy Heermance, Miami Director of Aviation, and R. V. Waters, president of the Greater Miami Airport Association. The Contest Committee will consist of Lew Sevier, chairman; Carl Egge, referee; Carl Schory, timer; Eddie Rickenbacker, scorer; Eddie Stinson, starter; Carl Voelter, technical committee; Dr. A. J. Bertram, assistant referee and Burns Chalk, assistant starter.

In the accompanying illustration are shown the committee chairmen of the air races:

Back row: Robert Moor, war birds; Lew Sevier, contest; Leland Hyzer, educational; Dr. Cleghorn, first aid; C. H. Reeder, Mayor; J. N. Lummus, City Commissioner; Frank Wharton, City Manager; A. H. Heermance, Miami Aviation Director; Judge Hancock, hotels; Walter Bruns, advertising; Charles Nieder, trophies.

Front row: Dr. Bertram, assistant referee; A. D. H. Fossey, special transportation; R. V. Waters, general chairman; Jack Rice, announcing; Bob Davidson, passes; A. L. Reynolds, transportation; A. W. Eisenmayer, badges; Francis Miller, N. A. A.

Committee chairmen of Miami All-American Air Races to be held January 8th to 10th

Shoenhair Sets New Speed Mark

A NEW world's record for a 1,000-kilometer flight over a closed course was apparently established October 27 by Lee Shoenhair at Akron, Ohio. He covered the distance in three hours and forty-seven minutes at an average speed of 164.26 miles per hour for 625 miles. The world's record of 154.29 miles per hour was established by Fernand Lasne of France.

Shoenhair flew his plane twenty times around a fifty-kilometer triangular course. The flight was observed by officials of the National Aeronautic Association and instruments used on the flight have been sent to Washington, D. C., for homologation.

MAKES SOLO NON-STOP NEW YORK TO PANAMA FLIGHT

THE first solo non-stop flight from New York to the Panama Canal Zone was completed November 10 by Capt. Roy W. Ammel who landed his plane the *Blue Flash* at France Field, Colon, Panama, twenty-four hours and thirty-five minutes after the take-off at Floyd Bennett Airport, New York, N. Y. Captain Ammel's flight was the third non-stop flight from the United States to the Canal Zone, the previous flights, however, starting from Miami, Fla.

Captain Ammel estimated his total flying distance at 3,189 miles. Head winds and poor visibility were encountered practically throughout the flight. There were 140 gallons of gasoline in the tanks when the flight was completed, sufficient for approximately five hours of additional flying. The plane carried 703 gallons of gasoline and thirty-four gallons of oil on the take-off, sufficient for a 4,000-mile flight. No radio was carried.

The plane used on the flight was a Lockheed "Explorer," a low-wing monoplane. There are eight gasoline tanks provided, four in the fuselage and four in the wings. The maximum gasoline capacity is 818 gallons.

Captain Ammel flew by dead reckoning all the way, aided by the beacon system along the United States air lines, in Cuba, the Isle of Pines, and thereafter went by the sun.

American Eagle Company Developing Export Market

FOREIGN headquarters for distribution of the American Eaglet will be established in Norway, Sweden, Great Britain, Spain, India and the British West Indies, according to an announcement of E. E. Porterfield, Jr., president of the American Eagle Aircraft Corporation, Fairfax Airport, Kansas City, Kansas. Two pilot salesmen are being sent to Madras, India, and Trinidad, British West Indies, to assist dealers there to organize flying services.

Elgin Receives Government Orders

HENRY G. BOYNTON, Eastern representative of the Aircraft Instrument Division of the Elgin National Watch Company, announces the receipt of a contract from the Bureau of Aeronautics, U. S. Navy, for 300 aircraft clocks. Other recent Government orders included 500 sets of compass magnets for the Army Air Corps

THE Apollo Motor Gauge has been purchased by Joseph Weidenhoff, Inc., Chicago, Ill. The Apollo Motor Gauge is an indicator which times engines to the thousandth of an inch, locates top dead center, synchronizes ignition and tests the coil and condensor under actual working conditions.

THE Chinese government recently placed an order with the Triangle Parachute Company of Cincinnati, Ohio, for twenty Hoffman Triangle Parachutes. The order included ten Triangle 'chutes of the back pack type and ten 'chutes of the seat pack type. The Triangle company reports an increase in the number of employees and the inauguration of a night shift in order to meet an increasing demand for Triangle Parachutes of every type.

Waco RNF Awarded A. T. C. Equipped With Edo Floats

THE Waco three-place open-cockpit biplane Model RNF, powered with a Warner Scarab engine and equipped with Edo Model 2260 floats, has been granted an Approved Type Certificate as a seaplane. Tests were conducted at the Edo Aircraft Corporation base in College Point, Long Island. The ship was flown by Engineering Inspector Jack Moran of the Department of Commerce; George B. Post, vice president and chief test pilot of Edo; and Dick Young, chief test pilot of Waco.

The ship was licensed with a useful load of 757 pounds, including three persons, full tanks of gas and oil, fifteen pounds of luggage, anchor, rope and other miscellaneous equipment, and exceeds the useful load as a landplane by ten pounds. It developed a top speed in excess of 110 miles per hour.

A RADIO receiving set for use in intructing glider students has been designed by Fred Eaton, Oakland radio engineer. The set is installed in the glider and is used to communicate with students making instruction flights.

The apparatus is seven inches wide, thirteen inches high and seven inches deep. The total weight, including two dry B batteries and two C batteries, is nine pounds. A two-tube telephone hook-up is used.

Thirty feet of wire stretched along the edge of the glider's wing forms the receiving aerial. The set requires no operation on the part of the student, who receives the voice messages of his instruc-receiving aerial.

COMING AERONAUTICAL EVENTS

November 28-December 14. International Aero Show, Grand Palais, Paris, France, auspices of Chambre Syndicale des Industries Aéronautiques.

December 1-5. Fifty-first Annual Meeting, American Society of Mechanical Engineers, Engineering Societies Bldg., New York, N. Y.

December 5-6. Regional Aviation Conference, Portland, Ore.

December 10-23. International Congress of Aerial Security, Paris, France.

December 16-17. National Conference on Uniform Aeronautic Regulatory Laws, auspices U. S. Department of Commerce, Washington, D. C.

December 31. Entries close for the International Tests for Silk Parachutes, auspices French Ministry of War, Paris, France.

January 8-10, 1931. Third Annual Miami All-American Air Races, Miami Municipal Airport, Miami, Fla.

January 11-25, 1931. Second Annual All-Florida Air Tour, auspices Florida State Chamber of Commerce.

February 1-20, 1931. First Pan-American Aeronautical Conference, Montevideo, Uruguay.

March 25-27, 1931. Third National Airport Conference, Mayo Hotel, Tulsa, Okla.

April 11-19, 1931. International Aircraft Show, Detroit, Mich., sponsored by Aeronautical Chamber of Commerce and Aircraft Bureau, Detroit Board of Commerce.

May 15-31, 1931. International Aero Exhibition, Stockholm, Sweden.

Offers Tract of Land For Use of Glider Clubs

THE use of a tract of land located at Mount Prospect, a suburb of Chicago, has been offered to glider clubs and individual glider owners in the Chicago area, by T. E. Mead, glider manufacturer and owner of the tract. There is to be no charge for the use of the property. No provision for storage has been made. However, owners will be permitted to build small storage sheds or shelters.

GLIDING RECORDS MADE AT ELMIRA

NEW American records for altitude and duration were established at the National Soaring Contest, Elmira, New York, September 21-October 5. Porter Adams, chairman of the executive committee of the National Aeronautic Association has announced the following official calibration of the barographs carried by the competing pilots.

On September 30, Jack O'Meara remained aloft for six hours and forty-eight minutes, establishing an American record for duration; and on October 10, Warren Eaton climbed to a height of 3,159 feet, not only an American record for altitude in this type of craft but a record that approaches the world record of 3,940 feet, made by Johannes Nehring, at Bregstrasse Field, Germany, in 1929.

During the meet, Wolf Hirth, German glider pilot, remained in the air in his German-built craft for over seven hours. This record could not be recognized as the American record since the rules of the Federation Aeronautique Internationale states that an American record to be recognized as official must be made by an American citizen. Mr. Hirth is a native of Germany.

[L. EPSTEIN]

THE first glider club in Elmira, New York, with a definite organization policy and permanent officers, was organized recently. The club will be known as the Arnot Gliding and Soaring Club of Elmira. Mr. Hastings, winner of the Evans trophy during the First National Soaring Meet, will instruct members.

At the first meeting of the club, Mr. Hastings spoke on the training of a glider pilot and the course of instruction which he will use.

The auto-towing method of instruction will be used. The instructor will drive the tow car and observe the student piloting the glider.

Waterplane Combines Gliding and Outboard Motorboating

THE Waterplane, a craft which combines outboard motorboating with gliding, has been developed by Robertson Brothers, Clinton, Iowa. The outfit consists of a glider which is connected by means of two struts to a boat-like float aft of the glider. Suspended from the wing of the glider is a hull containing a cockpit for a pilot and passenger. The struts extend from the rear of the hull to the float. An electric-starting Elto Quad outboard motor is mounted on this float.

Controls similar to those on an airplane are provided. The take-off is accomplished by pushing a starter button located in the cockpit and connected to the outboard motor. The Waterplane is pushed over the water and then takes to the air, flying several feet above the surface of the water. The craft is designed to bank, climb or descend as does a powered plane or glider.

PLAN OF EDGEWATER FLYING CLUB

THE Edgewater Flying Club, a non-profit corporation organized two years ago, recently opened a downtown aernautical university which will give complete aeronautical training at cost, according to George K. Spanier, president of the club. In order to centralize control and responsibility, the complete management of the organization has been placed under the supervision of Major J. C. "Cliff" Bryan.

Day and evening instruction in all phases of aeronautics will be given. Courses will range from the introductory course to the Master Course, which will comprise both the Aircraft Mechanics Course and the Administrative Course. Special attention will be given to coaching limited commercial and transport pilots for their Department of Commerce tests.

An Air Transport Course is offered. This is the same course given by the Northwestern University and will be supervised by the same lecturer, Mr. Thomas Wolfe, Jr.

All instruction is given in modern licensed aircraft and by transport pilots. Approved type parachutes will be used at all times. A definite outline of flying instruction has been prepared and all flying will be done on a "time-table" schedule.

The club has applied for Department of Commerce approval as a flying and ground school. Formerly operating from an out-of-town airport, the club has transferred flying activities to the Central Air Terminal hangars at the municipal airport. Members will be flown to the South Town Airport, where student instruction will be given.

Each member of the club has both vote and voice in all affairs of the organization. Members annually elect a board of directors. All vouchers for expenditures are signed by at least two directors and a monthly financial statement is published to all members. Any surplus funds accruing are expended upon new equipment. The sole object of the club, according to Mr. Spanier, is to promote aviation by making competent and complete aeronautical training available.

THE Aviation Grand Ball of the Edgewater Flying Club is scheduled to be held December 8 at the Trianon Ball Room, Sixty-second Street and Cottage Grove Avenue, Chicago. Recipients of twenty-five lucky admission tickets will be given prizes, the first prize being a complete private pilot's flying and ground course, including twenty hours in the air.

Test Airplane Muffler and Device for Penetrating Fog

TWO new inventions designed for use in the aviation industry were recently tested at Roosevelt Field, L. I. The first, a new device for penetrating fog by the use of the infra-red ray, was developed by Paul H. MacNeil, architect. During the tests, he penetrated more than a mile of dense fog, according to reports. The device is similar in general to the radio compass. The ray is projected from the ground and is picked up in the device by a thermo-coupler, which transforms it into a minute electrical impulse. The impulse, recorded on a delicate measuring instrument, guides the pilot to the source of the ray. The inventor explained that the device would have to be made lighter and smaller before it would be entirely adaptable to airplanes.

The second invention, developed by Miss Eldorado Jones, is a muffler designed to reduce the noise of airplane exhausts.

NEW YORK

R. W. CRAMER and Company, distributors of Swiss precision instruments, including Sauter Times Switches, have moved to 67.69 Irving Place, New York, N. Y., where they will occupy the entire eighth floor.

A RECENT improvement to the Irvin air chute, made by the Irving Air Chute Company, Buffalo, N. Y., is the use of chromium plated cones instead of brass cones formerly used. The ripcord pins are placed through the eyes of this cone to hold the pack together. When the ripcord is pulled these pins are removed from the eyes of the cone, thus releasing the entire pack. The advantages of chromium plated cones over those of brass are that they present a harder surface, are less likely to wear and better withstand corrosion.

BLAINE STUBBLEFIELD has been appointed a member of the staff of Doremus & Company, New York, N. Y., as part of its expansion program in the aviation field. Mr. Stubblefield has been engaged in aviation work since the World War when he was a flying instructor at Brooks Field, San Antonio, Texas. He was formerly affiliated with Boeing Air Transport and Air Investors, Inc., in a publicity and advertising capacity. Mr. Stubblefield recently completed a survey of American air transport lines.

MANY of the methods used in the manufacture of watches over a period of seventy years have been adopted by the Elgin National Watch Company in the manufacture of precision instruments for the aircraft industry, according to a statement recently issued by the company. Altimeters and air speed indicators made by the company are fitted with six and seven ruby and sapphire jewels, respectively, employing methods used in watch manufacture. All tools, dies, jigs and fixtures used are made by the Elgin company and many special machines developed in handing small precision work on a production basis are utilized. All parts are made in fixtures and jigs.

FIVE members of the Sunrise Airport at Ozone Park, N. Y., recently passed the Department of Commerce examination for a private pilot's license. This brings the total number of licensed pilots trained by the club to fifteen—two transport, three limited commercial and ten private. Bert Shields is chief instructor.

THE night lighting system installed at the Glenn H. Curtiss Airport, North Beach, Quenns, L. I., was placed in operation on the evening of November 7. The dedicatory ceremonies included addresses and night flying.

WHARTON CLAY, architectural and contracting engineer, has affiliated with the Truscon Steel Company of Youngstown, Ohio. In his connection with the Truscon Steel organization, Mr. Clay will help promote the service which Truscon extends to the profession and trade, will contact larger projects which involve permanent building products, and will develop fields for the application of new ideas in merchandising.

A COURSE in airport design has been introduced in the curriculum of the Daniel Guggenheim School of Aeronautics at New York University. E. K. Harvey is the faculty lecturer.

The course includes selection, grading of the landing field, lighting problems, communication problems, hangar design and location and signalling.

CENTRAL NEW YORK

[M. MARVIN]

NIGHT flying by private owners at the Amboy Municipal Airport has been encouraged by the moderate charge which the city makes for the use of the night lighting facilities installed at the field. R. L. Kincaid, manager of the field, and Ray Albring, assistant, announced that the city desired to coöperate with pilots and would permit night flying at any time, the actual costs of operating the lights being defrayed by the owners. Under the plan adopted by the city, a charge of $2 per hour is paid by the owner of each plane flown at night from the airport.

THE Syracuse Municipal Airport and the Empire Air Transport, Inc., have combined in order to make a larger all-way field.

FLYERS, INC., recently opened an aviation school with thirty students enrolled in the flying course and fifty in the ground school. The company operates eight planes and maintains an authorized parts and service station for the Curtiss-Wright Corporation. Robert Aldrich is president; Gordon K. Hood, manager; C. H. Bennum, chief pilot and operations manager; George Woster, chief mechanic; and Edward Boss, in charge of engines.

MAINE

[L. E. FLETCHER]

A PLANE of Consolidated Airways, Inc., was recently chartered by the Maine Forestry Department to make a survey of forest fires raging in the State. During the survey, which occupied two days, practically all of the State was covered and thirty-one fires were reported.

THE Caribou Municipal Airport, which was dedicated recently is being developed into one of the best fields in Maine. The field has an east-west runway 3,300 feet in length and a north-south runway of 2,500 feet. A hangar capable of housing twelve

planes has been built. A rest room and other facilities are provided. The field is located about one-half mile from Caribou.

From this field Aroostook Airlines, Inc., operates a Travel Air biplane on sightseeing trips and in flying instruction. Officers of the corporation are: H. H. Whitney, president, O. E. Blackden, vice president; and M. D. McGrath, secretary and treasurer.

NEW JERSEY

[F. L. FITZPATRICK]

THE U. S. Department of Commerce has issued a warning to pilots against flying near Pedricktown where TNT is stored. The area is located northeast of airway beacon 66 near Pennagrove, and 67 beacon, near Bridgeport.

MEMBERS of the Bamberger Aero Club, Newark, were addressed recently by Robert Buck, former junior coast-to-coast record holder. He praised gliding as the finest training for those who contemplate a flying career. He advised the boys to build their own gliders, learn all about them, and fly them.

TRANSCONTINENTAL and Western Air Inc., moved into their new offices at Caldwell, during a celebration marking the dedication of the new field. There were about fifty-five visiting planes and more than 30,000 spectators.

RAND HOLLIDAY and Richard D. Morgan of Wilmington, Del., recently inaugurated a flying service. They are distributors of Curtiss-Wright planes in their territory.

CONSTRUCTION of a new plant of the National Lock Washer Company to add to their present building in Newark, N. J., has been completed. The plant, designed by Monks and Johnson of Boston, is a four-story fireproof reinforced concrete structure. This structrue covers a gross area of 50,000 square feet.

PENNSYLVANIA

AN aerial tour of 1,500 miles requiring five weeks and visiting twenty-six airports, was completed recently by C. H. Gillette and R. C. "Bud" Havens, sales manager and test pilot respectively, of Taylor Brothers Aircraft Corporation, Bradford, Pa. The tour was made for the purpose of demonstrating the Taylor "Cub" high-wing monoplane weighing 450 pounds and retailing for less than $1,500. The following cities were among those visited: Elmira, N. Y., Roosevelt Field, L. I., Wilkes-Barre, Pa., and Ottawa, Canada. Five planes were sold on the tour and a distributorship in Canada was awarded.

PHILADELPHIA

[R. GARD]

LIEUT.-COMDR. ROBERT C. HEDTLER, aeronautical consultant to the Department of Public Works, in a report to Mayor Mackey recently, stated that tentative plans for the proposed seaplane base and of the proposed airport at Hog Island, including studies of the relocation of the railroad facilities so that the railroad lines will not interfere with the airport, have been prepared.

Plans for the subsurface drainage needs and for the proposed bulkhead line have been prepared for submission to the United States district engineer, so that definite plotting may be made of the proposed industrial sites. After removal of buildings and other obstructions on the site have been made, the complete site is to be leveled in preparation for the work on subsurface drainage and airport beacon installation. Plans for the airport beacon, planned to be one of the largest in the world, have been completed. Upon approval by the Department of Commerce, the beacon will be erected.

COMMERCIAL production of the Pitcairn-Cierva Autogiro is now definitely under way. Within two or three months a number of machines are expected to be ready for distribution. Several changes have been made in one of the newest models of the Autogiro. A 300-horsepower engine will replace the 225-horsepower engine formerly used.

THE Noel Davis Trophy, awarded annually to the most efficient aviation division of the United States Naval Reserve, was recently presented to Lieutenant Commander Hedtler, of the aviation division of the 4th Naval District, at the Philadelphia Navy Yard. The trophy has been won three times in the last four years by the same unit.

MARYLAND

[E. W. WALSH]

DURING the first five months that the new Curtiss-Wright Airport, Baltimore, has been in operation nearly 60,000 persons have visited the field, according to William D. Tipton, general manager of the Curtiss-Wright Flying Service in Baltimore.

COMPLETION of the Baltimore Municipal Airport seems assured. Citizens recently voted favorably on the $2,500,000 airport loan necessary for finishing the project which has been started and on which $1,500,000 has already been expended. The entire project will cost about $4,000,000.

MORE than one hundred flights have been made by members of the Glen L. Martin Company Glider Club, of Baltimore, Md., sixty of which were made during the course of two days. The club was organized in April but actual flying did not begin until recently.

Conduct Tests for Shipping Planes by Railroad Freight

THE Glenn L. Martin Company, aircraft manufacturers of Baltimore, Md., in cooperation with the Pennsylvania Railroad, recently conducted tests for the purpose of determining the precautions necessary in boxing the flying boats being shipped from the company's plant to the West Coast.

Glenn L. Martin, president of the company, announced that a constant check will be kept on each shipment by means of an especially designed instrument which will be placed in each car. This device, it was explained, will keep a second-by-second record of the history of the car from the time it leaves the Martin plant until it reaches its destination at San Diego. Clock-like devices and tapes of paper will register every blow the car receives, noting at the same time the very day and hour every shock during transit is received.

OHIO

[T. E. LUNSFORD]

DURING the first nine months of 1930, 1,241 planes landed at Port Columbus, and 1,177 planes took off. During this period, 5,046 passengers arrived, and 5,574 departed. This is exclusive of the 6,433 sight-seeing passengers and 1,516 student flights reported.

THE engineering department of the Fairfield Air Depot, Dayton, has moved into the new engineering shops building, completed recently.

THE Ohio Public Utilities Commission has requested telephone, electric light and power, telegraph and similar companies in Ohio to coöperate with airway officials, airport authorities and the U. S. Department of Commerce by eliminating wherever possible wires and poles adjacent to airports and intermediate landing fields.

H. P. WHITTLE, chief instructor of the Aviation College, Inc., Akron, announces the development of an airplane engine heater designed to keep the engine ready for starting in spite of severe weather conditions.

THE Main Aeronautics Co., Pittsburgh, started the operation of a Pittsburgh-Cincinnati line November 1. Stops are made at Huntington, W. Va., and Portsmouth, Ohio.

COLUMBUS

[W. DONALD WALTER]

MAJOR MUEHLENBERG, Corps Area Air Office, and Lieutenants A. E. Harter, Sam Sharp, and D. F. Rummage, Air Corps Reserve officers on active duty at Camp Knox, have returned to Columbus from duty at Camp Knox, Kentucky.

PRIVATES Norburn, Gheen, Blazack and Gehrman, Air Corps, have been detailed from Selfridge Field to Norton Field. Three of the new men will act as me-

(*Continued on next page*)

(Ohio News continued)

chanics, the fourth being used for clerical work. Arch Sumpter and Glenn Scarberry, two civilian mechanics, have had their hands full caring for our own ships and for Army ships landing here on cross-country flights.

LIEUTENANT McCONNELL, in an O2H, and Captain Grand Melvin, Air Corps Reserve, in a PT1, flew to Schoen Field on November 8 to attend a contact camp for Reserve officers in the Indianapolis district. Other recent cross-country flights from Norton Field were made by Captain Harold Sites and Lieutenant Walter, both Air Reserve, to Fairfield for semi-annual physical examinations; and Lieutenant McConnell and Lieutenant Walter to Martins Ferry, Ohio. The purpose of the latter flight was to inspect Scott Field, a privately-owned landing field at Martins Ferry. This is a good two-way field, but not very clearly marked. It lies along the west bank of the Ohio River, north of Martin's Ferry, and between that city and Yorkville. The field is about 2,500 feet long, is smooth, and the approaches are free from obstacles. Because of high hills on both sides of the river, it is necessary, when taking off either up-stream or down-stream, to follow the river for some little distance to gain altitude.

NORTON FIELD has been allotted one of the new Heil service trucks, thirty of which were recently completed for the Air Corps. Delivery of the new truck is expected in the near future. This unit is completely equipped for the servicing of all types of airplanes, facilities being provided for the furnishing of gasoline, oil, air and water. Provision is made for the delivery to the ships of pre-heated oil and water, the necessary heat being furnished by the exhaust gases of the truck engine. This feature will materially speed up the starting of airplane engines in cold weather. Gasoline, oil and water pumps are gear driven from the truck transmission. The new unit will replace a G. M. C. tank truck of war-time vintage which has been in service since the field was established.

KENTUCKY

[A. W. WILLIAMS]

ADDISON W. LEE, chairman of the Louisville & Jefferson County Airboard, in his annual report to Mayor Harrison, requested a new plane beacon light and concrete taxi strips. Other requests include an auxiliary landing field, for use chiefly of students; seeding and fencing, an airship anchorage, gas service and more office space. All available office space is now occupied.

FOUR Louisville men will have been selected by the Aeronautics Branch of the Department of Commerce and the American Engineering Council, to coöperate with similar committees in various parts of the country in gathering data on airport surfacing and drainage. The local committee, which will study the local situation, especially at Bowman Field, is composed of A. A. Krieger, chief engineer, Louisville; Addison W. Lee, member of the Louisville & Jefferson County Air Board; George R. Armstrong, construction engineer; and Ben C. Ford, of Stonestreet and Ford, engineers and surveyors.

INDIANA

[R. HOENIG]

THE Lenert Aircraft Company of Kentwater, Mich., plans to move its factory to South Bend. At a meeting of the city aviation commission, the company was granted permission to rent a hangar at the city's municipal airport.

According to the plans of the company, aircraft manufactured at the Michigan plant will be assembled in South Bend for the present, and early next spring the main factory will be moved to South Bend.

The production of the company is said to be one plane a week. With the removal of the plant to South Bend, it is planned to increase production.

MICHIGAN

P. R. BEASLEY has been appointed president of the Detroit Aircraft Corporation by the board of directors. He succeeds Edward S. Evans who resigned to devote more time to the Evans Auto Loading Company.

C. T. DARE has recently been appointed to the sales organization of the Ex-Cell-O Aircraft & Tool Corporation, Detroit, Mich. He will be attached to the Dayton, Ohio, office and will cover Indiana and Southern Ohio.

EX-CELL-O Aircraft and Tool Corporation, Detroit, Mich., has awarded the contract for the design ad construction of a new unit for the Continental Tool Division to the Austin Company, Cleveland, Ohio. The new plant, which will be erected at Detroit, adds additional manufacturing floor space to the Continental Tool Division. The new building is fifty-three feet by 190 feet, and is a one-story steel frame construction.

WILLARD H. DOW has been appointed president and general manager of the Dow Chemical Company, Midland, Mich., to succeed Dr. Herbert H. Dow, deceased. The company produces Magnesium Metal and Dowmetal alloys for the aircraft industry.

[J. M. HILL]

THE three-cent State tax on gasoline used in airplanes cannot be levied against those planes engaged in interstate commerce, according to an opinion handed down by the Attorney General of Michigan. Congress alone has the right to regulate or tax commerce between the states. It is estimated that almost half of the $41,078 in taxes collected last year on gasoline used in aviation in Michigan was levied against planes engaged in interestate commerce. The request for an opinion was filed by the Ford Motor Company, operator of a private freight line. The opinion does not affect the validity of the gas tax on motor vehicles.

THE Pierson Flying School, to operate from Plainfield Airport near Grand Rapids, has been granted a license by the Michigan Board of Aeronautics. Roland Pierson is operator and flight instructor. A Stinson Detroiter, a Travel Air biplane and a Driggs Skylark will be used for flight training.

POSTPONEMENT until spring of definte action with regard to establishing an airport at Mt. Pleasant, has been made by the Mt. Pleasant City Commission. At that time the proposition may be decided by ballot. The chamber of commerce and the commission, which worked together on plans for the establishment of an airport, agree that the question can best be decided next spring.

JAMES KUKLA, president of the Lakeshore Airways, Inc., Muskegon, has been appointed manager of the Muskegon County Airport by the Muskegon County Road Commission. Twenty-four-hour service will be maintained at the airport and the Lakeshore company will establish a ground school classroom for use in its private pilot course.

A NUMBER of requests have been made to the Michigan Board of Aeronautics by operators of airports throughout the State for funds to develop and improve their landing fields, according to Louis Firsht, secretary of the board. Under an act of the 1929 Legislature, the State is authorized to expend money to improve airports, but opposition has been raised to this measure on the ground that it is in violation of a clause in the State constitution which limits appropriations for such improvements to highways construction and reforestation projects.

TALBERT ABRAMS, head of the Abrams Aerial Survey Corporation, has completed an aerial survey of Isle Royal, an island portion of Michigan on Lake Superior.

WISCONSIN

[W. SCOLLARD]

THE Milwaukee Parts Corporation has voted to increase its capital stock from $53,000 to $150,000, according to A. J. Tank, vice president. Following Government acceptance of a newly designed airplane engine, the firm plans to begin production immediately on an increased scale. The company was organized eleven years ago.

Officers of the company include J. L. Michalski, president; Louis Schieble, treasurer; and William Unger, secretary. F. C. Tank is sales manager.

MAITLAND FIELD as a permanent landplane airport has been voted down by a special committee appointed early in the year to study the problem of selecting a

lake-front airport. The committee voted in favor of the construction of a permanent ramp for use of amphibions and the discontinuance of lighting the field for night landings.

IOWA

[I. W. MOORHEAD]

FORTY-FIVE employees of the Meredith Publishing Company, Des Moines, have organized a glider club. Twenty-three members are receiving instructions in glider flying. Don Sweet is president of the club; Forrest Blair, vice president; Katherine McGlone, secretary; and Ray Bath, treasurer. Leo Brennan, pilot of the Yellow Cab Airways, Inc., Des Moines, is chief instructor. Members of the club have purchased a glider for instruction. This is the first glider club formed in Des Moines.

THE first step toward acquisition of the Jones-Smith tract by condemnation for use as a municipal airport have been taken by George Comfort, City Solicitor of Des Moines. Truman Jones and W. B. Smith, joint owners of the 240-acre tract located at South West Twenty-first street and Army Post Road, have been notified that the city legal staff is ready to negotiate before condemnation takes place.

NEBRASKA

[J. R. LOWELL]

NEBRASKA Flying School has been incorporated at Lincoln with an authorized capital stock of $25,000. Alva Gaylord is president and John A. Kolbenschlag, vice president and general manager. Present headquarters are at Union Airport. Plans are under way for the construction of a hangar at the field, for which articles of incorporation calling for $25,000 in authorized stock have been drafted. Stinson and Great Lakes aircraft products will be handled by the company.

A SPECIAL R. C. A. radio set for receiving weather reports has been installed at Union Airport, Lincoln. It is a high frequency set.

AMONG the improvements which are being planned at the municipal airport, Omaha, early next year, are an administration building with depot facilities, lunch room, rest rooms and other accommodations for the public; provisions for the Government weather bureau; facilities for radio service; and fencing of the field.

SIDLES AIRWAYS CORPORATION, distributors for Curtiss-Wright in Nebraska, have appointed as representatives B. F. Brotherton, North Platte, and York Air Service, Inc., of York.

BOEING AIR TRANSPORT, INC., has signed a ten-year lease for use of the municipal airport at Lincoln. The company will pay $10 a year for landing and take-off privileges at the field.

OMAHA

[C. P. RODMAN]

THE Omaha banks, acting in conjunction with the Omaha National, have asked the Department of Commerce for permission to place a beacon on top the bank building as a guide to flyers. The beacon would have a fixed directional shaft of light, which 183 feet above the street, would point toward the municipal airport.

AT the election held on November 4, bonds to the amount of $100,000 a year for the next five years were voted for further improvements at the Omaha Municipal Airport. Three large runways will be completed at once and more land will be acquired.

Plans furnished by the Austin Company will be carried out by the construction of an administration building.

OKLAHOMA

[C. M. COLE]

A TOTAL of 7,779 persons arrived or departed by plane during September at the municipal airport, Tulsa, Oklahoma. A total of 1,650 planes checked in and out during that period. The high record made by this port was in June when 11,009 passengers arrived or took off at the field.

AN airplane ambulance service that is reported to be paying its way, is being operated by Dr. Fowler Border of the Border-McGregor Hospital, Mangum, Oklahoma. Dr. Border uses a Stinson monoplane, powered with a Lycoming engine and equipped to carry three passengers and one patient.

MISSOURI

ST. LOUIS

[T. P. WAGNER]

OFFICERS of the Valley Birdmen, a new flying club organized under N. A. A. rules, were elected recently as follows: Robert L. Nash, president; Irwin Maurer, vice president; Miss Edna Rudolph, secretary; and H. D. Pyle, treasurer. The club has purchased a Moth plane, and appointed Lieut. Fred Fisher, U. S. N. R., as operations manager. Three members own planes which they operate at the Curtiss-Steinberg Airport.

A REDUCTION in rates to five cents a mile was announced recently by Robertson Airlines, operating air transport passenger service between St. Louis, Memphis, and New Orleans. The new fare to New Orleans is $31.50, replacing the former cost of $45. During the first six months of operations the line carried 1,236 passengers without an injury, and operated 94.6 per cent efficient.

A "FOREIGN LEGION" of flying students has been organized at Parks Air College, which has an enrollment of forty-eight foreign students from the following countries: India, Siam, Ecuador, Spain, Canada, Cuba, Alaska, Colombia, Hungary, Germany, Mexico, Peru, Panama, Philippine Islands, Porto Rico, Bolivia, Hawaii, and West Indies.

THE last runway at Lambert-St. Louis Field has been surfaced, completing the season's construction program. The field is now in fine shape for winter operations and, by following connecting taxi strips, ships may land, discharge passengers, and depart without getting their undercarriages muddy.

FLORIDA

[J. M. MURRAY]

A SWALLOW training plane has been delivered to the Ocala Aero Club, Ocala. The plane is a two-place Swallow, powered with a five-cylinder Kinner engine and has a high speed of 100 miles per hour.

THREE of the airships of the Goodyear-Zeppelin Corporation, Akron, Ohio, will be based in Florida for operation in the Southern States during the winter months, according to a recent announcement of officials of the company. The *Defender* and the *Puritan* will be based at Miami and the *Vigilant* at St. Petersburg.

GEORGIA

[C. LAIRD]

AN enthusiastic campaign for air markings, inaugurated several weeks ago by officers of the Air Corps Reserve in Atlanta, through the Atlanta *Georgian*, has begun to show results, with pledges to erect air markers being received from chambers of commerce, civic bodies and individuals in sixty Georgia towns.

With the idea in view of making Georgia the most thoroughly air marked state in the South, appeals have been sent to 188 towns to provide some markings visible from the air. Letters at least ten feet in height of orange on black background were specified as the most desirable.

DEVELOPMENT of the new Savannah airport, a municipal project, is reported to be progressing at an encouraging rate. The tract, consisting of 260 acres, is nearly one mile square, and provides two runways of 4,500 feet and 3,200 feet in length, with a lack of high obstructions on all sides. It is practically all landing area. Present facilities consist of gasoline pumps and oil tanks. The erection of a steel and concrete hangar by the city is expected to be started in the near future.

ATLANTA'S municipal airport, Candler Field, has been equipped with concrete aprons and taxi strips through the combined efforts of city and county authorities. Approximately 105,000 square feet of six-inch concrete were laid and have been a great aid in checking the dust.

CONTACTS

By Frank E. Samuels

SAN FERNANDO VALLEY, lying as it does just outside of the fog area, is becoming known as the "Safety Zone" by air travelers and pilots visiting this territory. It is dotted with airports from its eastern entrance to its extreme northwest, all of them being within gliding distance from each other at an altitude of from 2,000 to 3,000 feet.

Among these airports are some of the best in the West if not in the country. On entering the valley from the South or the East, just north of the Hollywood mountains, is the airport of the California National Guard Air Service; just north of it and almost adjoining is the Grand Central Air Terminal. A short distance north and west is the private airport of Lockheed Aircraft, used for test planes and as an emergency field. Then, less than a mile northwest is United Airport, a division of United Aircraft and Transport Corporation.

Within almost a stone's throw from this airport is the flying field of the Wilson Brothers, devoted to student instruction and moving picture flying. Roy Wilson is considered one of our best motion picture pilots and is usually kept busy in their production. Due west, and less than a mile, is the flying field of the Glendale Flying Club. Just a few blocks further and along the same boulevard is the Victory flying field.

A FEW miles further north and we are at the Los Angeles Metropolitan Airport, one of the first of the up-to-date airports to be opened and operated in the Los Angeles territory. On account of the climatic conditions and the scarcity of fog this port has become a favorite landing field for pilots flying from the North, as it is possible to land there, even when the mountains and the coast are completely closed in with fog.

Bob Lloyd, one of the most successful and popular pilots and instructors that we have here on the Coast, has a well-kept little airport, half-way between the United and Metropolitan airports.

There are a number of small flying and emergency fields between the Metropolitan Airport and the northern head of the valley at Saugus, where the Mountain Ridge Route starts, but all of the above are in a radius of less than fifteen miles in a direct line north and south.

CALIFORNIA

OAKLAND

[H. V. Waldorf]

GLIDER clubs of the San Francisco Bay region have formed the Western Interclub Glider Association. George Bremmer of the Floyd Bennett Glider Club, San Francisco, is president; Paul Ferron of the Ferron Glider school, Berkeley, vice president; Sam Eubanks, San Francisco, secretary; and P. S. Longyear, Ferron school, treasurer.

THE Golden Gate Glider Club of San Francisco has purchased a training glider from the Boeing School of Aeronautics, Oakland Municipal Airport. Lieut. Allen Bonnalie, dean of the school, John Milton and Wellwood Beall, members of the faculty, will aid members of the club in ground and flight instruction.

HERSCHELL HAZELTON has been elected president of the Hat-in-the-Ring Glider Club of Alameda. He succeeds Trevor Stine, founder of the club.

THE Elliott and Duck Flying Service has launched an expansion program at its base at the Oakland Municipal Airport with the leasing of a quarter of Hangar No. 2. The company operates an air taxi service, flying school and sightseeing service. Jack Elliott and Dick Fregulia are chief pilots. William Duck is general manager.

THE Fillmore Flying Service has opened a ground school at the company's Oakland Municipal Airport base.

INSTALLATION of a new fire alarm box system was recently completed at Oakland Municipal Airport. It consists of sixteen boxes placed at points about the field. Alarm signals are recorded in the air port superintendent's office and in the central dispatch station of the Oakland city fire department.

DEMONSTRATIONS of a new type disc brake for airplanes were recently made at Oakland Municipal Airport by Harry G. Newheart of San Rafael, Calif., designer of the equipment.

The brake assembly has two friction surfaces and one moving part. Newheart claims that the brake is "lock-proof" and that moisture does not affect its operation.

SAN DIEGO

[L. M. Earl]

THE Pacific Technical University, affiliated with the T. C. Ryan Flying School for all ground training under U. S. Department of Commerce transport approval, has extended its aeronautical training to the students of the San Diego Army and Navy Academy, Pacific Beach.

NINETY per cent of all flight students at the T. C. Ryan Flying School are enrolled for either the limited commercial or transport courses.

THREE Great Lakes Sport Trainers from the T. C. Ryan Flying School in San Diego formed a part of the recent California Air Tour. These planes, together with six pilots and co-pilots, comprised the largest delegation from any school in the State.

CELEBRATING eight years of continuous aeronautical activity at Ryan Airport, the various organizations which are controlled by T. Claude Ryan, veteran airman, recently held a three-day birthday celebration at San Diego, California.

Acting as hosts to thousands of San Diegans were the T. C. Ryan Flying School; the T. C. Ryan Aeronautical Company, distributors of Great Lakes Sport Trainers; and the T. C. Ryan Flying Service, which has carried approximately 60,000 passengers during that time.

ARIZONA

[H. W. Wilson]

THE Arizona Air Service, Phoenix, has announced an airplane ambulance service for any part of Arizona or adjacent states where suitable landing fields are available. A Stinson cabin monoplane has been remodeled with accommodations for two attendants and a patient in addition to the pilot.

ARIZONA ranks fifteenth among the forty-eight states in the development of all types of airports, a survey of the U. S. Department of Commerce shows. There are thirty-four commercial, municipal, auxiliary and intermediate airports in the State, of which twenty-one are municipal fields.

TWO-WAY voice communication system is being installed along its southern air mail route by Southern Air Fast Express, Inc., to assist in handling the daily passenger and mail planes. This route has also been designated for lighting by the Department of Commerce, following which planes will be placed on a twenty-four hour daily basis.

COLORADO

[I. R. Alexander]

THERE are seventy-three airplanes and 145 licensed pilots in Colorado, according to a report of the Aeronautics Branch of the U. S. Department of Commerce. While Colorado is outranked by several states in the number of planes and pilots reported, it is third in the number of gliders, 108 being listed for the State. This is exceeded only by Michigan and California.

CENTER AIRWAYS, INC., Saguache, has filed articles of incorporation. The company has a capitalization of $50,000. The incorporators are as follows: G. H. Bennington, C. H. Willis and P. Wadsworth.

SERVICE on an air passenger and freight route from Denver to the Western Slope will start soon, officials of Pikes Peak Air Commerce, Inc., state. The route will be from Denver to Durango via Alamosa, Pueblo and Colorado Springs, with stops at intermediate points; and from Grand Junction to Alamosa, connecting with Delta, Montrose and Gunnison. Three ships will be kept in service. The operating time is expected to be three hours and forty-five minutes from Denver to Durango, and four hours from Denver to Grand Junction.

CANON City's Chamber of Commerce, will aid in the development of a municipal airport, according to Ray Ricketts, president of the board.

IDAHO

[I. M. DURNIN]

BETWEEN fifty and seventy-five planes have visited Clarkston's airport during the last few months.

Figures indicate that business has trebled this year over that of any previous one at the local airport.

O. J. SAN, representative of the American Model Aircraft and Glider Association, stated recently that twelve persons have signed as charter members to form an advisory board for a Shoshone chapter, including Wallace, Burk Canyon and Mullan.

This organization will be divided into two divisions, junior and senior. The junior division includes the study model aircraft construction and flying and the senior division covers flying of man-carrying gliders.

OFFICIAL notification of authority to operate an interstate air transport service between Spokane and Boise via Moscow was received recently from the U. S. Department of Commerce by the Moscow Air Transportation Company, according to an announcement by Harry Ruddach, manager. The approval covers the route, schedule and type of planes used by the Moscow company.

NAMPA'S municipal airport will from now on be known as Ritchey Field, named in honor of the late William Manley Ritchey.

UTAH

[G. PERRINS]

A MODEL aeronautical ordinance is being considered by the Ogden City Commissioners, according to Wiley R. Wright, aeronautical inspector for the U. S. Department of Commerce. Surrounded by states which are enforcing State aeronautical laws, Mr. Wright said Utah is becoming the dumping ground for obsolete, antiquated, unlicensed and unworthy planes. The proposed model ordinance requires that planes shall carry identification and shall be licensed by the U. S. Department of Commerce to operate from the airport at Ogden. Both the plane and the pilot, under the ordinance, would require licenses. Passage of the law, Mr. Wright said, will do much to advance aviation through promoting safety and allowing the industry to progress. Not a serious accident has been reported at Ogden Airport, and the city plans to bar unlicensed planes from the airport in hope of keeping up this record. Inspector Wright grounded three private airplanes recently because they were not displaying their identification marks issued them by the Department of Commerce. The movement for air safety is growing daily.

AIRPLANES operating in interstate commerce may use gasoline free from the State tax, and taxes that have been collected under this State law must be returned, according to a recent decision of Judge Roger I. McDonough, Salt Lake. The decision was made when George P. Parker, Attorney General, stipulated that it is unconstitutional to collect the tax.

The case was brought to court by the National Parks Airways, Inc., Western Air Express and the Boeing Air Transport Company, which sought to collect taxes paid the State under protest.

Idaho

AIRPLANES are taking a prominent part in the development of mining in Idaho, with efforts being made to revive the Old Moose City district, on the upper Clearwater River in northern part of the State. Dredging machinery will be transported to the deserted camp by plane. Landing fields in the district will be made. No highways over which heavy mining machinery can be hauled are available.

NORTHWEST

BOEING AIRPLANE COMPANY is maintaining a normal production organization and at the present time has a pay roll of 925, working on military and commercial planes.

DURING the first ten months of 1930, Pacific Air Transport, Boeing System, carried 117 tons of air mail, as compared with 105 tons for the same period last year on the Seattle-San Diego airway.

THE new combination hangar-depots being built for Boeing Air Transport have been completed at Elko, Rock Springs, North Platte, Iowa City and Reno. The buildings cost $35,000 each.

[F. K. HASKELL]

THE municipal airport at Pendleton, Ore., will be increased in area by the development of an additional 120 acres adjacent to the field. More than $3,000 will be expended on improvements.

A HANGAR will be constructed at Boeing Field, Seattle, Wash. Half of the building will be leased by the Federal Government. The structure will be of concrete, brick tile and metal sash, and will be 200 feet by 100 feet. The cost will be between $70,000 and $80,000.

H. S. HANSON has been appointed chairman of the aviation field committee at Polson, Mont. A tract of land for the development of an airport has been purchased.

MRS. EDNA CHRISTOFFERSON has been appointed governor for Oregon for the Women's National Aeronautical Association. Mrs. Christofferson is president of the Portland chapter of the Women's National Aeronautic Association.

AMENDMENTS recently made to the State aeronautics code limit "joy hopping." Designated areas at each end of Oregon's beaches will be roped off, one-half mile by 500 feet. In the future barn stormers who refuse to land or take-off in these areas will be penalized.

WASHINGTON

[C. M. LITTELJOHN]

GLIDER enthusiasts of Aberdeen have formed the Harbor County Glider Club. An incline will be constructed and will be the official take-off point for glider pilots in Aberdeen and the harbor cities.

THE semi-annual flying caravan of the American Legion is again on the wing in the State of Washington. Rene Odlin, State commander of the American Legion, and Mrs. Ernest L. Flaskow, are piloting the caravan to district conferences being held to promote legislation for those disabled in the war.

IMPROVEMENTS costing more than $6,000 will be made at the airport at Wenatchee.

AVIATION training in ground school subjects has been added to the curriculum of the University of Washington, Seattle. Seniors and graduates of recognized universities are eligible. Applicants must be under twenty-seven years of age, certify their willingness to complete twenty-one months of flight training after completion of the ground school course, and be physically and mentally qualified.

The successful ground school students of the University will be eligible for a course in aviation at the Naval Air Station, Sand Point, Seattle, and at the Pensacola Naval Air Station. Upon successfully completing the flight training courses, students will receive commissions as ensigns of aviation in the Naval Reserve. Commander Harvey McCormick of the Naval R. O. T. C. of the University of Washington, has announced that the course will be given without charge to successful applicants.

IMPROVEMENTS aggregating $100,000 will be made at the municipal airport, Spokane.

DON PHILLIPS has opened an air service between Seattle and Yakima via Wenatchee. The Seattle, Wenatchee, Yakima Airways, Inc., will use Kreutzer trimotor planes. Phillips will be chief pilot. A schedule of regular flights, with no flying on Sunday, has been arranged for the accommodation of business men. Phillips is associated with Clyde Palmer in the venture.

A NEW airport of twenty acres has been acquired by the City of Chewelah, and will be developed by the American Legion, which has charge of the new field. The Legion, chamber of commerce, and the City of Chewelah, coöperated in the acquisition of the field. The surface, will be cleared, smoothed, graded, and runways, hangars and other developments will be installed.

TRADE LITERATURE

NEW PAMPHLETS AND BOOKS OF INTEREST TO THE AERONAUTICAL INDUSTRY

Pilot's Information and Memoranda Book

A VEST-POCKET, leather-bound information and memoranda book for pilots has been prepared for distribution to airplane pilots with the compliments of Stanavo Specification Board, Inc. The book may be used by pilots for recording important memoranda; as a practical aid in affording a ready reference to useful aviation information; to assist in recording flying time until transcription to Pilot's Log Book; and to provide a convenient form for keeping expense accounts while on cross-country flights.

Rainbow Neon Lighting Equipment

RAINBOW Neon areonautical lighting equipment, manufactured by Rainbow Light, Inc., Long Island City, N. Y., is described in a booklet recently prepared by the company. In addition to descriptions of the full line of Rainbow Neon equipment, the booklet discusses airport lighting problems and installations. The company announces that it is prepared to make complete lighting installations in conjunction with other standard makes and provides a service for making airport lighting layouts.

Nicholas-Beazley Catalog H

CATALOGUE H, published by the Nicholas-Beazley Airplane Company, Inc., of Marshall, Mo., lists the complete line of aeronautical accessories manufactured and distributed by the company, including specifications and prices. Airplane and aircraft engine accessories and parts lists, glider parts, books, tools and flying equipment placed in the market by the company are described and illustrated. There is a table of different standards for wire, screw and rivet gauges, one of decimal equivalents, and a complete index of the products listed. Instructions to follow when ordering are given.

Campbell Nibbling Machine Catalog

A CATALOGUE describing the Campbell Nibbling machine has been issued by the Andrew C. Campbell, Inc., Bridgeport, Connecticut. The catalogue describes the complete line of Campbell Nibbling Machines and gives a detailed description of the operation of the machine showing how sheet metal can be cut on the nibbling machine in a fraction of the time required by other methods.

Standard Catalog

THE Standard Electric Tool Company, Cincinnati, Ohio, is distributing a new 64-page catalogue No. 36, and price list No. 36. A number of new tools are featured. The booklet describes and illustrates the complete Standard line of electric drills, grinders, buffers and polishers.

Heating Airport Buildings

A FOLDER describing the installation and maintenance of heating equipment for airport buildings and other large structures has been prepared by the American Blower Corporation, Detroit, Mich. The folder discusses the problems of heating airport buildings and illustrates the use of American Blower equipment in meeting these problems.

Heat Treatment of Steel

"HEAT Treatment of Steel," is a booklet prepared by the General Electric Company describing this process in G. E. standard electric furnaces. The text is illustrated with photographs and drawings. The table of contents is divided into four parts as follows: Heat Treatment of Steel; How Electric Heat Treatment Affects Production Costs; Construction and Maintenance of G. E. Electric Furnaces; and G. E. Standard Electric Furnaces. Discussion of this subject in detail is contained under these main headings.

Aluminum Die Castings

DISCUSSION of die casting in general, pointing out the main characteristics of this process, as well as the aluminum die castings produced by the company, is contained in "Alcoa Aluminum Die Castings" prepared by the Aluminum Company of America.

Air Terminals

"AIR TERMINALS," a booklet published by the Portland Cement Association, was prepared as concise, authoritative and attractive summary of airport needs and services.

On the basis of experience in the use of concrete and other cement products in airport equipment obtained by the company over a period of years, the booklet is offered as a guide to commercial and civic airport operators. Among the subjects discussed are airport design, buildings, runways, lighting facilities, drainage, hangar floors and aprons. There is also a section on European experience with concrete airport installations.

New Gear Catalog

THE new ninety-six page catalog of small and medium-size gears issued by the Ohio Gear Company, Cleveland, Ohio, has been prepared not only to give as complete information as possible regarding the wide range of stock gears which the company manufactures, but to bring together in handy pocket-size form, the formulas and information in the design and adaptation of gearing and reduction units of various types to meet particular requirements.

Electric Tool Catalog

A SPECIAL catalog describing the new flexible shaft equipment of the United States Electrical Tool Co., Cincinnati, has been issued. The catalog shows a broad range from ¼ to 3-horsepower sizes inclusive, and in all styles of mountings—overhead or vertical, trolley, floor or stand, bench or horizontal. It is devoted to discussion of three classes: Engraver's Models, Die Sinkers or Form Filing Models, and Heavy Duty Models. A complete range of highest quality tools for engraving, filing, rasping, polishing, grinding, etc.. is also shown.

DuPont Fabrikoid

THE Fabrikoid Divion of E. I. DuPont de Nemours and Company has issued a booklet which describes the development ot this product, emphasizing the style, design, color and texture as well as the practicability of Fabrikoid. Of particular interest to aviation is the use of this product in the upholstery, headlinings and general interior decoration of airplanes, described in the booklet.

Hercules Punches and Retainers

HERCULES Interchangeable Punches and Retainers for piercing metal are described in Catalogue No. 94 prepared by Whitman and Barnes, Inc., Detroit, Mich., manufacturers of this equipment.

The introduction to the catalogue is explanatory of the principle of this new system of punchers and retainers and their application. The text is illustrated with drawings, photographs, and charts illustrating the construction and operation of Hercules Punchers and Retainers.

Titanine Aircraft Dopes

TITANINE, INC., Union County, N. J., has prepared a booklet entitled "Titanine Aircraft Dopes," which discusses the subject in its entirety; the history and development of dopes, descriptions of the various types, and problems of application. General instructions on doping, troubles commonly encountered and their prevention are discussed in detail.

Wood In Aircraft Construction

FOR the benefit of aeronautic engineers and designers and students of airplane construction, the National Lumber Manufacturers Association has prepared "Wood in Aircraft Construction," a reference book giving information on wood and its use in this field. The book is the work of George W. Trayer, C.E., and represents a compilation and digest of data obtained in research and conducted in Government and private laboratories during the past quarter-century.

Hicycle Portable Tools

THE Chicago Pneumatic Tool Company, New York, has prepared Catalog SP-1782 illustrating and describing some new additions to the Hicycle line of portable electric tools.

Booklet on Manometers

A POCKET-SIZE booklet entitled "The Manometer and Its Uses" has been published by the Meriam Company, Cleveland, Ohio. It is intended to fill the need for a handy and compact booklet dealing exclusively and comprehensively with the manometer, its operating principles and the uses to which it may be put.

G. E. Welding Electrodes

THE various types of electrodes produced by the General Electric Company are described in a booklet published by the General company. The text, illustrated with photographs, depicts the practical application of this G. E. product.

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Kester Solder

A FOLDER describing Kester Flux-Core Solder, made by the Kester Solder Company, Chicago, Ill., has been prepared by the company. The publication is addressed especially to Kester dealers and discusses the campaigns promoted to advertise this product in addition to the product in general.

National Standard Screw Threads

THE U. S. Department of Commerce has prepared a booklet entitled, "American National Standard Screw Threads, Commercial Standard CS24-30." The booklet incorporates the essential tables of dimensions of fastening screws, accepted and approved by producers and distributors for promulgation by the Department of Commerce as recommended commercial standard.

Aircraft Radio

"AIRCRAFT Radio Receiving Equipment," a bulletin describing apparatus developed by the Aircraft Radio Corporation, Boonton, N. J., has been prepared for distribution to the aircraft industry. The various units and their uses in aircraft communication are described and illustrated.

Westinghouse Catalog

DESCRIPTIONS and illustrations of apparatus representative of the products manufactured and sold by the Westinghouse Electric and Manufacturing Company are contained in the Westinghouse General Catalog, 1931-32, comprised of 1,352 pages. The catalog contains an "Instant Index."

Gluing Wood

A REPORT of the Technical Session of the Association of Asphalt Paving Technologists, October 30, 1929, was recently published. The papers on the problems of asphalt paving presented at the meeting are contained in this volume.

Cleaning of Metal

"CLEANING OF METAL," by Robert W. Mitchell, Ph.D., discusses processes, methods and materials and contains suggestions for their use. The book is copyrighted by the Magnus Chemical Company, Garwood, N. J.

S. A. E. Steel Standards

A PAMPHLET listing the standard specifications for steels of the Society of Automotive Engineers has been prepared by the International Nickel Company, Inc., New York City. The specifications are from the report of the Iron and Steel Division, S.A.E.

Louden Systems

"ECONOMICAL Material Handling," a booklet describing the Louden Industrial Monorail Systems and their use in industry, has been published by the Louden Machinery Company, Fairfield, Iowa.

Caterpillar Machinery

THE Caterpillar Tractor Company, Peoria, Ill., has published a book entitled, "Building Roads Better, Quicker, Cheaper with Caterpillar Track-Type Tractors and Road Machinery." The problems of road building and the application of Caterpillar machinery in their practical solution are discussed in detail.

Highways of Tomorrow

"HIGHWAYS of Tomorrow," published by the National Airport Engineering Company, Ltd., Los Angeles, Calif., and Cleveland, Ohio, discusses airport design, engineering and management and the services which the company maintains in this field.

Buyers' Guide

A DIRECTORY of manufacturers, fabricators and distributors of nickel alloy steel products has been prepared by the International Nickel Company, Inc., New York City.

Five Years Afterward

A COMPREHENSIVE economic survey of the State of Florida has been completed by the Trust Company of Florida and the results published in a booklet entitled, "Five Years Afterward.

NEW AERONAUTICAL BOOKS

Reviewed by STEPHEN A. MCCLELLAN, B.Sc.

Skycraft
By AUGUSTUS POST

AUGUSTUS POST has devoted almost as much time to the study of boys as he has to the study of aviation. Skycraft has been written primarily for the youth of the nation and its pages are ample evidence that he knows his readers as well as he does his subject.

Starting with an admirably terse historical review, the text runs rapidly through the theory of flight, the fundamentals in aircraft construction, engines, propellers, instruments, and the control of a plane in flight. Similarly, parachutes, gliding, soaring, free ballooning, dirigibles, airports, and airways and the weather are briefly discussed, thus rounding out a concise but complete story of aviation.

The book is diagrammed and has many illustrations although no attempt has been made to present a complete pictorial representation of modern American planes. A glossary of aeronautical terms is appended.

Aviation Engine Examiner
By VICTOR W. PAGE

THE question and answer system has long been highly regarded as a most effective system of instruction. Page's latest instruction book on the theory and repair of aviation engines is written entirely in this manner. The book is well arranged topically and is completely indexed for reference purposes.

It is unfortunate that so much text and so many illustrations are devoted to foreign and obsolete engines not in common use in this country today.

Wood in Aircraft Construction
By GEORGE W. TRAYER

AN authoritative and complete treatise that should be of particular value to students of aeronautical engineering and inspectors of aircraft material. It is of value as a reference book. Treating with the characteristics of all types of lumber, its supply, production, inspection and proper handling. Seasoning, bending, gluing, protecting, etc., are covered as well as practical and theoretical phases of design for the use of wood. A bibliography for further reading is appended.

advice is given regarding the formation of gliding clubs, proper instruction and suitable terrain to operate over. The book is illustrated with diagrams and pictures.

The Royal Air Force Quarterly, Vol. I, No. 2
Editor: Squadron-Leader C. G. BURGE

DISCUSSIONS of the status of British military aviation up to April, 1930, are contained in "The Royal Air Force Quarterly," embodying, in addition to the Royal Air Force in England, that organization in Australia, Canada, New Zealand and South Africa. The book is edited by Squadron-Leader Burge, assisted by an advisory committee of the R. A. F. Articles by aviation officers active in British military aviation are listed under the following headings: Operations and Intelligence; Personnel, Organization and Administration; Research and Technical Development; Armament and Equipment; and History and Travel. The volume contains in addition feature articles and short stories of general interest, notes on the Royal Air Force and discussions of civil aviation.

The Journal of Air Law
Vol. 1—No. 4, published by Northwestern University Press for
THE AIR LAW INSTITUTE

IN this issue the proceedings of the First National Legislative Air Conference are recorded. Some subjects presented are: "The Beginnings and Growth of Aeronautical Law," "Recent Developments in International Aeronautical Law," "Aeronautical Law in America," "The Interstate Commerce 'Burden Theory' Applied to Air Transportation," "A Survey of State Aeronautical Legislation." Articles on radio law and regulation complete the issue.

Handbook of Culvert & Drainage Practice
PUBLISHED BY ARMCO CULVERT MANUFACTURERS ASSOCIATION

A VERY complete text offering solutions to all types of problems in both surface and subsurface drainage. There are a good many airport engineers who would benefit by a close study of this little volume as the condition of their fields mutely testifies every spring and fall.

THE Hancock Foundation College of Aeronautics, Santa Maria, Calif, will inaugurate a new long-term school training course for high school graduates and will carry them through approximately two years of junior college work. Negotiations are under way with the State Board of Education whereby the college is to become a State junior college giving college credits to its students for their work in aeronautical and allied subjects.

The changes and reorganization will not affect either the flying or ground school curriculum for private and transport pilots, in which grades a Department of Commerce approved school certificate has been issued the school.

TOURNAMENT STUNT PLANE

(*Continued from page* 123)

knows that a model frequently shows signs of tail heaviness (oscillates up and down) when flying straight but that this tendency immediately disappears as it starts to circle. In other words, circling seems to promote nose heaviness. The converse of this is to be found in a model which flies stable straight, but noses down on turns. Now our little model is designed especially for turns. If we start out with it tail heavy, it will not slip inward in its turns. Then again as it circles we want it to come back into our hands. It should slow up—it should even stall, if possible, and this is just what it does. If we launch it banked vertically, it makes its circle, gradually flattening out, and when it returns it stalls because it is now level and consequently tail heavy.

Now for the abnormal fin area represented by the rearward location of the D.C. If we launch our model level and with elevators neutral, it is very evidently tail heavy. It falters and lacks directional stability. It will turn to right or left readily. Indeed sometimes it will turn both right and left for a single adjustment and on a single flight. This is the result of stalled flight and lack of sufficient flying speed. To restore to a degree directional stability, which would be natural if the C.G. were in the normal location about one-third from the leading edge, the larger area back of the C.G. is necessary.

Thus we see that our abnormalities are the result of an unusual C.G. location and that this is the result of special flight requirements.

Stunt Flying

Perhaps the foregoing is pretty far-fetched for some of our readers, but we all can join in on the flying stunts. Here are some. Maybe you can work out others.

Right Hand Circle—Adjust elevators slightly up. Rudder slightly left. Ailerons even. Hold tab of fuselage. Launch almost vertically with wheels to the left.

Left Hand Circle—Reverse adjustments throughout.

Loop—Raise elevators. Rudder and ailerons straight. If model strikes ceiling, raise elevators more.

Side Roll—Raise one aileron and lower the other. Launch level.

Immelman Turn—Right aileron down. Left up. Elevators up. Launch with wings level but nose up slightly. Model will climb, bank sharply and reverse its direction.

Tail Flip—Adjust all controls neutral. Hold by nose with tail hanging down and top of model towards you. Release so it turns over on its back and glides away from you. Raise elevators slightly to speed recovery.

Propeller Flights—It is simple to add a propeller to this model. Just cut out the shape from the same sheet of paper. The diameter should be only 1½ inches. Place a bead or washer on a pin, which is used for a shaft. Now press the pin into nose block. By twisting the blades the propeller will spin freely as the model glides. Note that the added weight increases the gliding speed, but the added resistance spoils the gliding angle.

One more thing before we turn to questions. That number NR-2Y on the wing and rudder was borrowed from Ben Howard's racer. (See page 62, November AERO DIGEST.)

Here's wishing you all a Merry Christmas and an Aeronautical New Year, but don't forget:

Where the C.G. location ordinarily is.

Why we balance the Tournament Special tail heavy.

The reason for abnormal fin area.

How the gliding speed can be increased.

Why the gliding angle becomes steep when a propeller is used.

LOUISIANA

[C. Cock]

THE City Council of Shreveport has asked bids for lighting fixtures and items of equipment for the municipal airport, according to Mayor L. E. Thomas. Office equipment has been purchased for $1,152, and gas steam radiation was contracted for with the Barrow Heating Company for $650.

THE City Council of Shreveport has arranged final details in connection with the transfer of the 22,000-acre site for the Third Attack Wing Base. An additional $150,000 will be expended for the removal of oil pipe lines beneath the surface. A resolution giving a warranty of title and guaranty of indemnity has been adopted. The site was purchased with a bond issue of $1,500,000.

THE Wedell-Williams Air Service, Inc., operating from New Orleans to Fort Worth, Texas, by way of Shreveport, La., has announced a reduction in passenger rates from seven and one-half cents to seven cents per mile. A round trip rate of six and one-half cents per mile has been adopted.

ESTABLISHMENT of a station in Shreveport to provide radio communication between planes in flight and the ground is planned by the Air Radio, Inc. The company has obtained a permit from the Federal Radio Commission to construct several new stations, which will operate with a 15-watt broadcasting power.

ALABAMA

[O. G. Jones]

THE Birmingham Air Service, Inc., has been adopted as the new name of the Birmingham Passenger Airways following the purchase of the company by the Aero Club of Alabama. The company will continue to operate as in the past and will have the agencies for Waco, Ryan and Lockheed planes in and around Birmingham. Merritt Craft is president of the new company.

TEXAS

THE University Glider Club was organized at Austin, Texas, recently with a limited membership of sixteen charter members. Officers of the club are Frank W. Posey, president; E. W. Meiners, vice president; A. V. Watson, secretary-treasurer; Bill Lewis, chief instructor; and J. W. Walker, chief instructor. A Waco glider has been purchased from Universal Aerial Service Corporation, Austin.

[C. Morris]

THE new Mexia Airport is the second Texas airport to be named for Col. William E. Easterwood, donor of the Paris-Dallas flight prize, awarded to Major Coste and Lieutenant Bellonte. This new airport was named Easter American Legion Airport, the other one being known as Easterwood Flying Field, Mineral Wells.

THE City Council of Perrytown has called a bond election, a $12,000 issue, for the purpose of raising funds for the purchase of 150 acres to be developed into an airport.

Fort Worth-Houston line of Southern Air Transport, the Dallas-Houston line of Bowen Air Lines, and the New Orleans-Houston line of Wedell-Williams Air Service.

THE Department of Commerce is planning the establishment of a landing field and the erection of a beacon light at Eden.

E. H. BOND of Houston has been appointed manager of the Curtiss-Wright flying field at Dalworth.

A BEACON and two flood lights will be installed at the airport, Quanah. A small hangar is being completed.

A FLYING school has been organized by J. A. Knolle at the municipal airport, Corpus Christi. F. H. Rogers will be chief instructor. A Command-Aire will be used for training purposes.

FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

ENGLAND

CONTRACTS for light aircraft involving a purchase price of approximately $350,000 have been received by the De-Havilland Aircraft Company. A total of eighty-three Moth planes for training and general service duties was ordered by the Royal Air Force; the New Zealand Ministry of Defense purchased eight ships, including one seaplane; and ten planes were ordered by the Chinese air corps. Four of the ships built for service in China will be equipped with floats interchangeable with conventional wheels for use as seaplanes on the Yang-tze River.

AN AIRPORT for the use of light airplanes only will be developed near London. A clubhouse and hangars for private owners will be erected.

ALL of the British light airplanes equipped with engines from eighty-five horsepower upwards may be purchased with floats instead of landing wheels, according to a statement recently issued by the Society of British Aircraft Constructors, Ltd. The British aircraft industry has developed a light amphibion gear suitable for this type of aircraft; this gear is designed so that the single central float and the land wheels do not materially reduce the performance of the aircraft which they equip.

EXPERIMENTS with airplane catapaults are being held at the Royal Aircraft Establishment, Farnsborough. Tests of a catapault weighing twenty tons and using compressed air to launch aircraft were recently made. Experiments were conducted with a Fairey biplane equipped with slotted wings, and successful launchings were made with this plane.

THERE are 295 private airplanes in Great Britain owned by 263 persons, over twenty of whom have two each, according to a recent report. Twenty-five of these ships are owned by women. The planes vary in type from a small biplane of below 100 horsepower to a plane of 1,500 horsepower.

THE way in which the British aircraft industry is endeavoring to meet overseas demands is indicated by the first details of extensive demonstration tours planned for the immediate future. The Westland Aircraft Works, which supplies military airplanes to home and Dominion air services, and civil machines to Imperial Airways and foreign air transport companies, is proposing to send overseas a number of fighting craft. Recently, a civil aircraft built by the company began a tour of Great Britain, Northern Ireland and the Irish Free State, visiting more than fifty of the more important cities and towns.

The itinerary prepared for the foreign tour covers Southern Europe, South America and China. "Wapiti" general purpose military aircraft, similar to machines operated by the Royal Air Force, will fly from city to city, demonstrating before government and air force officials. The planes on the tour of Southern Europe will visit Greece, the Balkan States, Yugoslavia, Spain and Portugal, and possibly Scandinavian countries and the Baltic States.

In South America the Westland company, in common with some other British firms, will demonstrate a military plane during the British Empire Trade Exhibition at Buenos Aires early next year. It is intended to demonstrate the plane later in other South American states.

In China a Wapiti will be demonstrated for several months. The tour will begin from Hong Kong and extend throughout the country.

The Westland Wapiti is a two-place biplane designed for bombing, reconnaissance, wireless, long-range patrol and advanced training. It has a top speed of more than 140 miles per hour.

GERMANY

PLANS for Zeppelins now under construction have been changed so as to provide for helium gas and crude-oil engines, according to an announcement made November 4 by Dr. Hugo Eckener at the annual dinner of the American Chamber of Commerce, Berlin. Dr. Eckener said he had received word from the United States that helium, which is non-explosive and non-inflammable and on which America holds a virtual monopoly, would be available to inflate German airships.

[E. P. A. Heinze]

THE attempt of the Belgian, Professor Piccard, to investigate the condition of the air at an altitude of ten miles at Augsburg in Germany with the aid of a special balloon has been postponed till next year. The balloon, made by August Riedinger, has a displacement of 495,000 cubic feet. Its diameter is approximately 100 feet. It is filled with only 70,630 cubic feet of hydrogen in view of the high rate of expansion of the gas in high altitudes.

New Sail-Flying Territory

THIS year, sail-flying, which owes its inception to Germany, has gained international recognition as never before. Enthusiasts in all parts of the world have taken it up, and many are the delegates that are sent to Germany for training at the famous camp along the Rhoen hills. They come from Africa, New Zealand, Great Britain and Japan, and many of them are army officers. The chief of the staff of the South African army recently enrolled for a training course.

A fine new sail-flying territory has been discovered at Hirzenhain, a village in the federal state of Hessen. Village school teachers discovered this territory and they coöperated with teachers from the schools of neighboring villages to build a shed and develop the new site. Instruction is now under way. The range of hills is more than six miles long and 500 feet to 1,000 feet high. The well known German sail-flyer, Max Kegel, made the inaugural flight, remaining in the air for one hour and ten minutes.

Luft Hansa Starts Winter Schedule

ON November 1, the Luft Hansa began operations on its winter schedule which will be in effect until February 28, 1931. Scheduled service will be furnished eighteen German and eleven foreign centers. The length of the routes to be operated this winter is somewhat longer than last year, planes covering 8,500 miles daily as compared with the winter of 1929 when they covered 7,200 miles every day. This increase is the result of new connections which join the central German industrial area around Leipzig, Halle and Hanover with the trunk line leading to Amsterdam and London. Similar connections have been made from Munich to Vienna, joining the line to and from Budapest and Berlin-Breslau-Gleiwitz, by which latter line Silisia also retains its air connections for the first time during the winter season. Another new line is the one from Stuttgart in the south of Germany, via Geneva to Marseille and Barcelona. The line formerly started from Basle, Switzerland, and is especially important as a freight line. Night flying from Berlin via Hanover to the Belgian frontier has been organized and is of great importance for the Berlin-Amsterdam and Berlin-Paris services. Connections are also maintained to Scandinavia and Prague-Vienna.

THE German Aviation Union (Deutscher Luftfahrt Verband) announces satisfactory progress this year at the various training camps maintained by clubs affiliated with the union. It was in 1928 that the union authorized the club at Mannheim to carry through preliminary training of its members so that, when they came to one of the union schools, they would be well advanced. From September 1, 1928, to August 1, 1930, more than 7,000 flights were made. At the beginning of this period only three members were qualified pilots; now there are sixty-six. Since the inauguration of this club training camp, numerous other clubs in various parts of Germany have been organized and very effective work has been done by them, greatly facilitating the final training in the qualified schools. The Verein für Luftfahrt (Aviation Club) of Greiz in Thuringia has become the owner of a flying field, which was recently dedicated.

(*Continued on next page*)


"Pirate"
DEPENDABILITY
INLINE
BUILT TO FLY AN AEROPLANE
INVERTED
BUILT TO FIT AN AEROPLANE
PLUS - MINIMUM FRONTAL AREA
The MENASCO PIRATE AIRCRAFT ENGINE REPRESENTS THE FINEST IN MAERIALS AND WORKMANSHIP
90 HP AT 1925 R·P·M
MENASCO MOTORS INC
6718 McKINLEY AVE
LOS ANGELES CALIF.

(*Continued from preceding page*)

THE German Air Board, elected in 1924 as the head organization of the German flying sports movement, has dissolved in accordance with a resolution made at a meeting held June 4 of this year. The organizations affiliated with the board were asked to elect a smaller number of delegates. Up to its dissolution, the board comprised sixty-six members, but since its reconstitution it has thirty-nine members. The new officers of the board are: president, Von Kehler; vice presidents, Dominicus and Von Hoeppner, the latter being in addition the active manager; and Baur de Betaz, Binder, Boettger, Carganico, Cranz, Croneiss, Doering, Everling, Georg, Georgii, Von Gronau, Von Gruny, Hellwig, Hessing, Hoff, Hohmuth, Kaelin, Von Koeppen, Lahs, Loerber, Madelung, Paukisch, Poss, Sauernheimer, Schröeder, Schwarz, Stamer, Tetens, Ursinus, Wagenfuehr, Walter, Weese, Von Wilamowitz, Count Ysenburg, Zimmer-Voraus and Haarmann.

THE sail-flying territory of Borkenberge in the triangle of Westphalian towns Seppenrade-Dülmen-Haltern (Westphalia is a western province of the federal state of Prussia) has developed rapidly since last year. The second West German Air Sailing contest has been arranged there and life in the camp has assumed imposing proportions. Numerous barracks, tents and even a kind of rough and ready hotel for 1,000 persons have been established.

THE Nordbayerische Verkehrsflug, a company operating "hop" lines with twenty-two single-engined passenger planes, will continue operations throughout the winter. This company has agreed on a plan of coöperation with the Luft Hansa and maintains a number of services, which connect with the Luft Hansa trunk lines.

THERE is a rumor that the Junkers Aircraft Company is preparing a high altitude plane. This plane has nothing to do with rocket drives and, at present, it is more of a plan than a fact. Junkers are developing a petrol engine with a supercharger, with which they hope to reach very great heights provided they succeed also in solving the cabin problem, for this plane will need a cabin which can be hermetically closed and kept at an air pressure inside similar to that on the ground.

LILIENTHAL'S surviving brother has a plane with flapping wings practically ready for demonstration. He has been working at this for numerous years. Dr. Martin Bruchmann, whose hobby is flying and inventing, has completed the construction of a plane with flapping wings. This craft has actually accomplished a few hops.

SPAIN

The Aeronautical Industry in Spain

AS there is no aircraft with the exception of an autogiro of Spanish invention or make, the construction of aircraft in Spain is limited to the manufacture of foreign aircraft under license. The maximum capacity of all companies producing aircraft in Spain is approximately 600 planes and 900 aircraft engines annually. About 4,500 workmen are employed by these companies, which are reported to have a total combined capital of about 32,000,000 pesetas. During 1929, a total of 174 planes were built. At the end of this period there were 100 civil aircraft registered in Spain, the largest number of which were British. Only one American plane was listed.

In addition to forty intermediate landing fields, there were nineteen airports equipped with facilities for repairing and servicing aircraft. The sum of 1,000,000 pesetas was included in the 1929 budget to subsidize the construction of airports throughout the country.

FRANCE

THE French fliers, Captain Goulette and Pilot Lalouette, landed at Saigon, French Indo-China, November 13, establishing a new record for the flight from Paris. Five days, three hours and fifty minutes after their departure from Le Bourget, Paris, they landed at Saigon, a distance of 7,125 miles. They exceeded by thirty hours the previous record for this flight established by Major Dieudonne Coste and Lieut. Maurice Bellonte.

MORE than forty nations will exhibit aeronautical products at the International Congress of Aerial Security, Paris, France, December 10-23. Planes will be demonstrated at the airport at Orley, near Paris. A large hall in the building at 10 Avenue d'Iena, where the sessions of the conference will be held, will contain exhibitions of aeronautical equipment. No expenses other than insurance for demonstration planes will be attached to the exhibits, it is reported, and demonstrators will be permitted to arrange their own programs.

Parachute Competition Scheduled

AN international competition for the testing of silk parachutes will be held in Paris early next year under the auspices of the French Ministry of War. According to present plans, entries in the competition are due December 15 and the deadline for the arrival of exhibits is December 31. Prizes totaling more than $15,000 will be awarded.

Tests will be run by flinging the parachutes with 220-pound dummies from air-

(*Continued on next page*)

View of Croydon Airdrome, London, showing system of concrete runways installed at the field

planes at varying speeds and altitudes. The parachutes will be tested for rapidity and maximum effort of opening, speed of fall before opening, stability, ease in carrying, finish of construction and quality of materials.

The entry fee is 5,000 francs (approximately $195).

AN aerial police force which will enforce regulations forbidding commercial and private aircraft from flying over fortified areas in the Moselle Department of France has been organized. Planes flying in this territory are permitted to follow a route along the Saar Valley. Four military airplanes have been placed at the disposal of the aerial police, two of which are stationed at Metz and two at Thionville.

THREE classes of glider pilots' licenses will be issued by the Aero Club of France to candidates successfully passing the required tests, according to regulations recently promulgated.

ITALY

CONSTRUCTION of a special airplane engine designed for high altitude work has been completed by the Isotta Fraschini Automobile Company, of Milan.

ARRANGEMENTS have been completed by R. S. Deering, vice president and general manager of the Verville Aircraft Company, Detroit, Mich., U. S. A., for the delivery of a Verville Air Coach to the Italian government. The plane is powered with a Packard Diesel engine. This is said to be the first Diesel-powered plane exported by any American manufacturer. Commander Paolo Shenadori, Air Attaché for the Italian Embassy, witnessed tests of the ship at Detroit. The plane was shipped to Italy last month.

THE Isotta Fraschini Automobile Company, Milan, recently announced that the Czechoslovakian pilot, Swozil, flying an Aero A 42 plane powered with a Fraschini Asso 750 engine, established September 19 a world record of 252.380 kilometers per hour (156.828 miles per hour) as follows: over 1,000 kilometers (621.4 miles) without load; 1,000 kilometers carrying 500 kilograms (1,102.5 pounds); and 1,000 kilometers carrying 1,000 kilograms (2,205 pounds).

Staff Capt. Kalla, flying a Letov S 516 powered with an Asso 750 engine, established on September 30 a new record of 274.094 kilometers per hour (170.321 miles per hour) over 1,000 kilometers without load, breaking the record set by Swozil.

INDIA

A STEEL frame hangar will be erected at Risalpur for use by the Royal Air Force. The hangar will be 139 feet by 228 feet and will have a clearance of twenty-four feet. The building will contain offices, store rooms and facilities for light repair work.

PORTUGAL

A FLYING school has been organized by the Portuguese Flying Club. Twenty-four students have enrolled in the school and are receiving flight training at Zmadora Airport near Lisbon. A Moth plane is used. It is planned to establish airports and flying clubs throughout Portugal.

CANADA

[F. N. DASHWOOD]

STARTING Newfoundland's first air service, A. D. Sullivan and D. C. Fraser left North Sydney, N. S., November 8 for St. Johns, where they have a contract with the Minister of Posts to carry mail to outlying ports. Their first plane is a Gipsy Moth, purchased in Ontario.

CHANGING landing gear from the regulation type to skis on the air mail service operating between Moncton, Saint John and Montreal, the open-cockpit planes will be replaced by Fairchilds, and a regular passenger service will be inaugurated, according to A. E. Ingram, operations manager of Canadian Airways. It is planned that regular two-way flights with mail and passengers will be operated every day except Saturday and Sunday.

THE municipal airport at Saint John, N. B., which was recently granted a license by the Civil Aviation Department, will soon be lighted for night flying. The Dominion government has offered to pay half the cost of a lighting system up to $10,000.

[J. MONTAGNES]

Status of Canadian Aviation

AVIATION in Canada during the first nine months of this year has gone steadily ahead, according to latest information available at Ottawa. At the end of 1929 the total personnel in Canadian civil aviation was 657, as compared with 1,071 on November 1 of this year. This number includes 403 commercial pilots. The number of aircraft registered in Canada was increased by fifty-five this year, now totaling 500.

Air mail is showing signs of becoming greater than last year, which was the record for air mail in Canada with 430,636 pounds. During the first nine months of this year, 379,424 pounds of air mail were carried. During the third quarter of the year, the Toronto-Buffalo line carried approximately seven tons of air mail.

The government flying clubs now total twenty-one. Due to the fact that two of the clubs sustained financial reverses and ceased operations, there was a considerable decrease in club membership, which totaled 3,000 at the end of the first nine months in 1930 as compared with 5,000 at the end of 1929. The number of hours flown, however, has continued to keep pace with last year, being well over 11,500, while the total for last year was 16,600 hours. The number of licensed pilots, both private and commercial, increased considerably during the first nine months of this year, there now being 374 private and 120 commercial pilots as compared with 183 private and 58 commercial pilots at the end of last year.

There are at present 128 commercial operators in Canada, operating air mail, passenger and freight transportation services, instruction, air photography, advertising, forest protection, timber cruising, fishery patrols, crop dusting and other services.

There are at present in Canada eight firms engaged in aircraft construction, two specializing in landing gear construction and three in engine assembling, rebuilding and overhauling. The number of planes manufactured in Canada totaled 69, of which 25 were seaplanes. These planes manufactured during the first nine months of this year are valued at over $1,000,000, while planes assembled or rebuilt during the same period totaled 54 with a value of $400,000. Engines assembled and rebuilt totaled 171 with a value of more than $400,000. Landing gear manufactured consisted of 120 sets of floats and 37 sets of skis, the sales value of which was $130,000. Ten gliders worth $5,000 were manufactured during the same period in Canada.

CUBA

[DR. FELIPE PRIETO]

Cuba Inaugurates Air Mail Service and Reduces Passenger Rates

FOLLOWING a contract between the Cuban government and the Compania Nacional Cubana de Aviacion Curtiss, air mail service was started recently between Havana and Santiago de Cuba on the eastern end of the island, a distance of 510 miles, with stops at Santa Clara, Moron, Camaguey, Victoria de las Tunas, and Holguin.

Ford trimotor transports are used. The service is daily with the exception of Sundays. Postage is ten cents an ounce. Letters addressed from the United States to Cuba must have an additional five-cent American air maii stamp. On the day of the inauguration 40,000 letters were mailed to the different cities along the route. A letter sent by the ordinary means of communication would take thirty hours to travel from one end of the island to the other, whereas, using the newly established air service, it will reach its destination in six hours. Similarly, a letter for New York from Santiago de Cuba will leave this city in the farthest place of Cuba at 6:30 in the morning and reach New York at 8 a. m. the next day.

Another important event which boosts aviation in Cuba is the substantial reduction of passenger rates put into effect November 10. The reduction favors mainly the passenger flying the whole distance of 510 miles between Havana and Santiago de Cuba. It will now be cheaper to travel by air than by train on a round trip and twenty hours will be saved. The former rate on the round trip between the two terminal cities was $99.50, as compared with the new rate of $69.

(*Continued on next page*)

(Cuba News continued)

William D. Pawley, president of the Compania Cubana de Aviacion Curtiss, states that with the reduction in rates his company aims at placing the service within reach of the largest number of persons, and that in the beginning he does not expect to profit on the transportation of passengers.

The line has especially received the patronage of those interested in the industrial centers that it serves. In the provinces of Santa Clara, Camaguey and Oriente alone, are situated 112 of the 157 sugar mills in operation on the entire island.

MEXICO

Colonel Fierro Organizes the Aero Club de Mexico

COLONEL ROBERTO FIERRO, Chief of Civil Aviation in Mexico, recently called together a number of civilian fliers and prominent men connected with civil aviation, and formed the Aero Club de Mexico. All the members of this club are actively engaged in flying. Lic. Espinosa Mireles, vice president of the Compania Mexicana de Aviacion, a subsidiary of Pan American Airways, was appointed president.

The Aero Club de Mexico was officially inaugurated with an air meet at the Central Airport adjoining Valbuena military field. The thirty airplanes participating belonged entirely to the members of the club, and included Spartan, Gypsy Moth, Cessna, Fairchild, New Standard, Aeromarine, Bellanca, Curtiss Robin, Davis, and Avro. There was also a demonstration flight in a glider built in the local airplane factory of General Azcarate.

The Aero Club de Mexico is not affiliated with the Association Mexicana de Aeronautica which has been in existence for about two years. This latter was organized by Juan G. Villasana when he was in charge of Civil Aviation at the Department of Communications.

Several American fliers form a very important group belonging to the aero club, including Carl B. Schmidt, Firestone and Sunoco distributor, who represents Spartan planes in Mexico; H. O. Claywell, Chas. Pickard, C. L. Clabaugh, and Walter Tschuding, who also fly Spartan planes; Cloyd Clevenger, who has been conducting a flying school for the past year; and Charles Titus, local Curtiss-Wright representative.

[M. HURST]

THE C. A. T. air lines plan to inaugurate an improvement program, according to an announcement of A. Espinosa, Mexico City traffic manager. The great demand for transportation of express by airplane and the rapid increase in air travel over all branches of the C. A. T. lines have made it necessary for the addition of more planes. The improvements contemplated include enlargements of all airports, increased equipment at the large airport in Torreon, the headquarters of the company, with additional planes to take care of the line from Laredo to Tampico, to be opened as soon as the planes are acquired.

THEODORE HULL, president of the C. A. T. air lines, recently visited the United States to obtain permission from the United States Government for a contract to bring the United States air mail directly from the United States to Mexico through Loredo and Monterey. He has been negotiating with the Detroit Aircraft Corporation which will furnish a fleet of new all-metal planes for the new air mail route between Tampico and Monterey.

THE new C. A. T. air route between Nueve Laredo and Tampico, via Monterey, opened in October. Lockheed-Vega planes will be used on the new line.

THE General Postal Department plans the acquisition of two new airplanes to be used in carrying mail to sections that are without rapid mail service.

INTERPRETING a definite attempt by the Mexican government to encourage civil aviation among its own citizens, government officials explain the new basic law of aeronautics now in force in the Southern Republic.

Airplanes may be registered with the Department of Communications only by Mexican citizens. Foreigners may register aircraft if they file a statement to the effect that they consider themselves as Mexicans with regard to the law and will not invoke the protection of their government in connection with aircraft activities.

The personnel of the aviation companies must be at least eight per cent Mexican, unless special authority is granted. At least thirty-three per cent of the board of directors of any air transport company must be Mexican.

Planes are prohibited from flying over inhabited places at a height less than 1,640 feet. Stunt flying is prohibited over inhabited communities.

Pilots and other personnel must be licensed by the Department of Communications, and pilot's licenses must be revalidated every six months. Licenses issued by foreign governments will be recognized by the department if a reciprocal agreement exists between the foreign country and Mexico, the regulations read.

PERU

[H. GOMEZ-CORNEJO]

LAS PALMAS Airport and Flying School, situated six miles from Lima, is the center of military aviation in Peru. The field is owned by the Peruvian government, and is one of the airports used by planes of the Pan American Grace Airways, Inc. This field has been extensively developed and facilities for the repair and operation of planes are provided.

The surface of the field is level, dry and sown with grass and the surroundings consist of cultivated farming land. There are no surrounding obstacles but three radio towers are situated in the center of the field. There are two runways, one approximately 2,000 feet by 800 feet, and the other 3,100 feet by 900 feet. There are five wooden hangars, each with a capacity of five medium-sized ships, and an all-metal hangar 100 feet by 100 feet. Aeronautical supplies, including spare parts for engines and planes, are kept in stock. Gasoline and oil may be obtained and workshops and mechanics are available. Hotel accommodations for pilots and passengers are provided at the field and in the vicinity.

CHILE

Curtiss-Wright Opens South American Plant at Cerrillos Airport

CONSTRUCTION of an aircraft plant at Santiago de Chile has been completed by the Curtiss-Wright Export Corporation and work has been started on the first order of military planes for the Chilean government.

The factory, located at the Cerrillos Airport, consists of three buildings and the entire plant is designed to permit future expansion. The main factory building is of steel, brick and concrete and is 200 feet by 110 feet. A hangar of similar construction measures 119 feet by 120 feet. A smaller building housing a dope shop and spray rooms completes the present construction.

The company will turn out forty Curtiss Falcon military observation planes which comprise the first order. Present plans include the manufacture of twenty Curtiss Hawk pursuit ships for the Chilean air force.

The Chilean plant is equipped with machinery built in the United States and for the present the engineers and executives affiliated with the factory are Americans. However, as soon as it is possible to do so through the training of native labor, the employees will for the most part be comprised of Chileans. A group of Chilean students underwent a course of training recently at the Curtiss factory, Buffalo, N. Y., U. S. A., in preparation for work at the South American plant.

BOLIVIA

AMONG the Latin American delegates to the International Highway Congress held in Washington, D. C., U. S. A., recently was Captain Luis Ernst Rivera, a prominent member of the Bolivian air force. Although his trip to the United States was not officially connected with aviation, he planned to confer with aircraft manufacturers to be prepared to make suggestions to his government regarding future purchases of equipment.

Captain Rivera studied aviation in Paris, and graduated as a civil engineer in Zurich. Lately he represented his government in taking delivery of planes purchased from the Vickers company.

The planes used in the Bolivian military aviation are all of European manufacture, mainly Caudron, Vickers and Breguet. The present instructors in the military flying school are natives who were trained by French, Swiss and British instructors engaged specially for the purpose.

The airport at La Paz is the highest in the world, 13,448 feet above sea level.

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TOURNAMENT STUNT PLANE

A REALISTIC INDOOR FLIER OF PAPER

By

R. E. DOWD

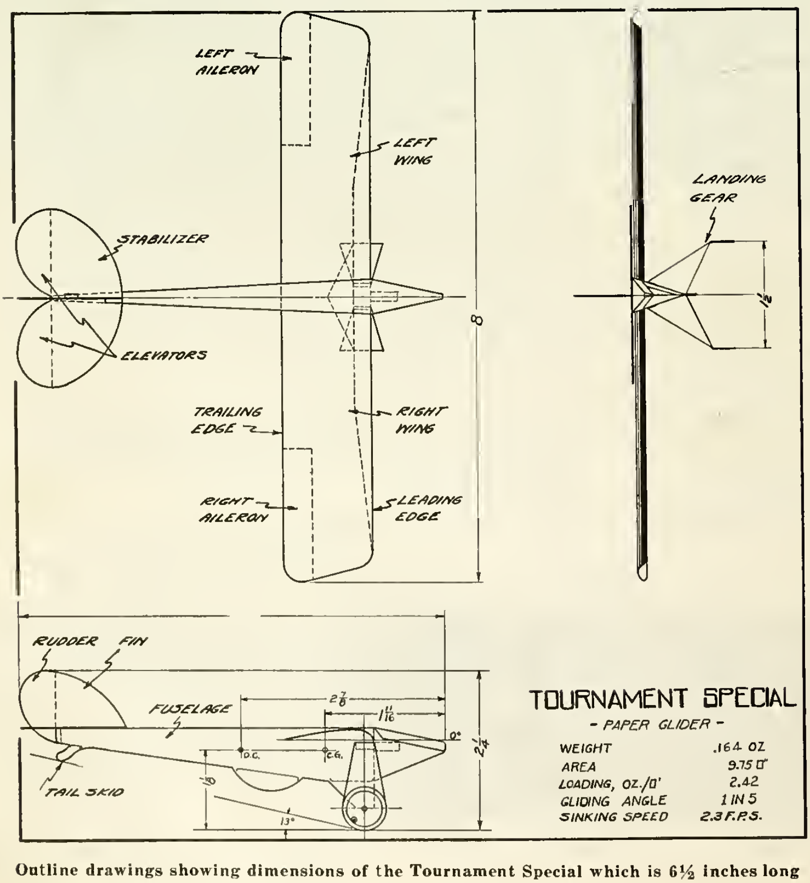
WINTER weather, with its skating, coasting and tobogganing, calls for indoor models, and preferably those which can be built on the kitchen table while the shoes and stockings are drying from the last snow fight. Models should be simple, too, so that boys can make them without taking too much time from their household tasks, such as bringing in wood and coal and running errands. With Christmas only a few weeks away, no boy can afford to lose his good standing with his family just to build a model airplane!

All these things have been taken into consideration in bringing out the "Tournament Special." But apart from all this, the little glider we are introducing deserves attention because it is just what we need for indoor flying through the long winter months. In your own living room this little realistic looking monoplane will circle, spiral and, if the ceiling is high enough, loop. After a little practice you can stand in one corner of the room and launch it so that it will circle all around the room and come right back into your hands. It is so rugged that it will last for months. A room as small as eight feet square has been used for circles but less skill will be required and better flights will be possible in a room at least twelve feet wide. Of course a gymnasium floor is the ideal indoor airport. Here double loops can be made when the model is new and the wings stiff enough to withstand the air pressure.

Some builders may feel that because they have been making more complicated models that it is not worth while to make a simple paper glider. This is hardly the case. Much can be learned from simple indoor gliders. Perhaps the very problems of adjustment, balance and stability, which have been troubling in the more complicated power driven models, will be cleared up as we experiment with the little Tournament Special. It has no upsetting propeller torque or fragile wings and fuselage parts. It is strong and durable, and it operates indoors under ideal conditions. Its control surfaces, ailerons, elevators and rudder may be readily adjusted. Even its balance may be changed in a jiffy by a thumb tack or pin in the nose block.

Before going on, we must tell how this little flier originated and why it is called the Tournament Special. Some time ago I was requested to get out a little paper model which could be made by members of a model airplane club and sold at an indoor tournament then being planned. The model was soon produced and boys all liked it very much. It was decided to make a hundred or more for sale at twenty-five cents each. The name Tournament Special was adopted for the occasion, and all hands went to work cutting out parts and gluing the assemblies together. It proved quite a tedious job to turn out that many, but since the club treasury needed the funds no one complained. Along with this was the task of getting new models built for the contests, and a hydro tank for take-offs from water, etc.

By the time the date of the meet rolled around all the boys were pretty tired, but there were two bushel baskets of Tournament Specials ready for sale. The doors swung open at the appointed hour and the crowd swarmed in. In the excitement we all forgot the models in the baskets, but they didn't escape the alert eyes of the visiting boys, who swooped down on them like a flock of vultures. In a few minutes the baskets were empty and the air was filled



Outline drawings showing dimensions of the Tournament Special which is 6½ inches long

with the little fliers. It all happened so quickly that the club boys were left amazed. We hear much about profits vanishing into thin air—here was a real tangible case. The incident was soon forgotten in the hustle and bustle of the tournament, which incidentally proved a success without the funds which were expected from selling the gliders. The moral of the experience, however, is first to appoint a watchman when such a nifty model as the Tournament Special is on public display. At least it should be made clear that they are for sale rather than free distribution.

But let's get out the scissors and go to work. Here's what you need to make the model:

Two sheets of good grade tough typewriter paper.

One sheet of carbon paper.

A pair of scissors.

A pencil.

A pocket knife.

A block of white pine or spruce ½ by ¾ by one inch.

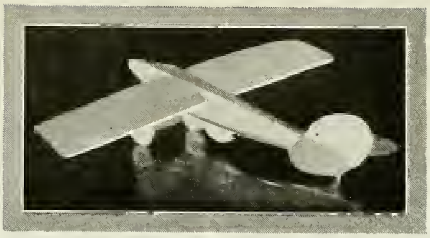
Glue or mucilage.

Piece of wire solder or nail for ballast in nose block.

Assembly Procedure

After we have collected our materials and tools, here's how we proceed:

(1) Trace all parts on the paper by inserting carbon paper under pattern drawing. Allow enough room for the complete wing span, which is eight inches. Be sure to trace all dotted and center lines.



The Tournament special stunt model

(2) Cut all parts on outlines.

(3) Score knife line very *lightly* on dotted lines to facilitate bending.

(4) Fold fuselage on dotted lines on either side of center line before cutting wing slots.

(5) Open fuselage flat and cut slots for wing.

(6) Glue upper ends of wheels to fuselage, taking care to match up center lines. See assembly drawing for location of tabs.

(7) Glue block to inside of top nose flap only. Weight should first be inserted in hole of block.

(8) Fold and glue fuselage, working forward from tail.

(9) Bend fin tabs and glue fin to stabilizer exactly on center line.

(10) Glue stabilizer to fuselage and insert and glue lower part of rudder into fuselage.

(11) Glue wheels together. See assembly drawing for arrangement.

(12) Fold and glue leading edge reinforcement of wing. Fold should be on under side.

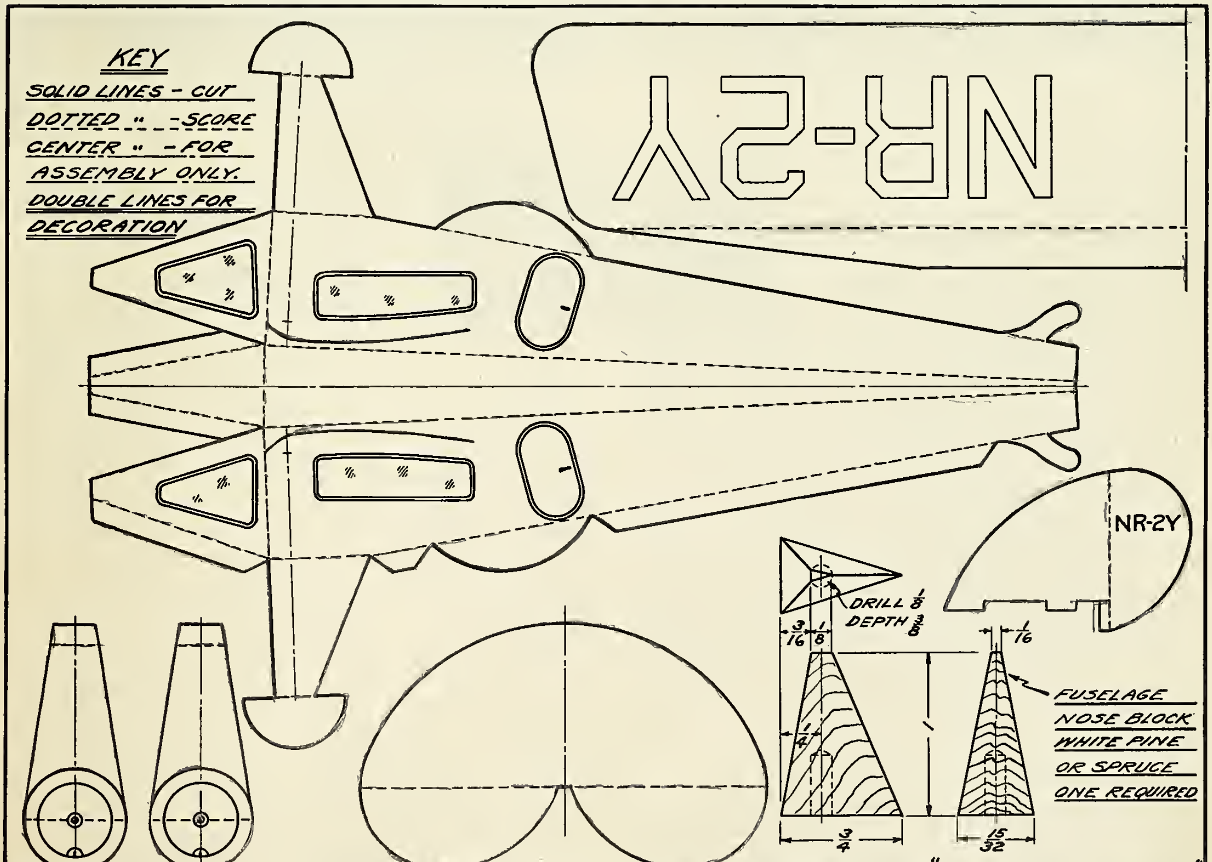
(13) Insert wing through fuselage slots and glue securely on both top and bottom sides.

(14) Carefully align entire model so that it is straight and true.

The C.G. and D.C.

After checking the alignment, we can check the balance by using a hairpin opened out to support the model under the wing. Just note on the assembly drawing that the C.G. is 1-11/16 inches back from the nose or about 50 per cent of the wing chord from the leading edge. This is very unusual. The C.G. is usually between 25 and 35 per cent. We have a good reason for making our model tail heavy, as we shall learn later. The next thing to note is the location of the D.C. (Directional Center) or center of lateral area relative to the C.G. Here we get an even greater jolt for our pet formula; span plus length times .025 to .050, is far off. In this case our factor is .085. In other words, the distance between the D.C. and the C.G. is 1-3/16 inches and this is approximately .085 times 8 plus 6. Let us see if we cannot justify these apparent discrepancies.

First, any model builder of experience (*Continued on page* 114)



WEATHER CONSIDERATIONS

(*Continued from page 47*)

Nova Scotia, to the mother country, with all the speed that air transport affords, is a reasonable possibility. Such a project calls for not only a study of the possibilities of the Azores-Bermuda route, but an Arctic route as well that would follow roughly a line drawn from Croydon through the Orkneys and the Faroes, across Iceland to Greenland, and thence either to Cape Chidley or Belle Isle.

Both of these routes offer the "longest way round as the shortest way home." Third and fourth routes which have received little or no mention are the Great Circle, the shortest of all, and the steamer route which parallels on its eastern half the Bermuda-Azores route and which might be expected to have similar weather. It also has one other advantage in being shorter than the Arctic and Azores routes and in offering generally better weather than the Great Circle. Its use, however, presupposes planes with extraordinary range, for there is no land anywhere on the route, though it passes a short distance north of the Azores.

Some of the advantages and disadvantages of the Bermuda-Azores route have been pointed out. The distance between New York and London by this course is approximately 4,700 miles if we follow the land south from London to La Coruna with a stop at Brest. Winds are generally westerly and the area, although not as consistently stormy as a more northerly route, is not without its storms, some coming from a little-known area. The longest water jump, as has been stated, is 2,100 miles and that indicates the demand for night flying and probably much blind flying. It means, as aviation is today, two pilots, and for safety's sake, a radio operator and a navigator. One of the pilots might double in either role, but a crew of at least three is highly desirable.

Now let us turn to the Arctic route. It is about 1,120 miles from Croydon to the east coast of Iceland by way of the Orkneys and Faroes. Add 180 miles more for the jump across Iceland to the west coast. Then we find a 580-mile water jump across to Greenland. Little is known of the practicability of crossing Greenland over the ice cap by air. Previous expeditions have followed the coast south to Cape Farewell, and the distance to Cape Farewell from a point on Greenland's coast due west of Reykjavik is about 300 miles. Then comes another water jump of close to 750 miles either to Cape Chidley or Belle Isle. Cape Chidley is a terminus of a course across unknown territory to Cochrane, whence Hassel and Cramer took off on their expedition to Europe which ended in Greenland. Between Cape Chidley and Cochrane, lies 1,040 miles of wilderness perhaps as dangerous as the open ocean to a pair of pilots down with a crippled machine. It is 570 miles from Cochrane to Chicago.

If our figurative airline is to connect New York with Croydon, we can branch off at Cape Farewell across Davis Strait to Belle Isle, whence it is more than 1,200 miles to New York. In all 4,130 miles to New York and via Cochrane about 4,220 miles to Chicago from London, a long distance as compared to the 3,445 miles of the Great Circle course, and over a region noted for its bad weather. No month in the year averages less than fifteen days rain from the Orkneys to near Greenland, and in those cloudy rainy regions, fliers are quite likely to find freezing temperatures creating the ice hazard which our own mail pilots have learned to fear with sufficient reason. The route crosses both east and west of South Greenland, areas of pronounced storm concentration and dispersal. In other words, storms converge there and lead out from there. When a low area moves up the well-beaten path of the St. Lawrence Valley into the Gulf, the navigator in Davis Strait or between Greenland and Iceland is in the position of a defending football team. He does not know where the weather is going to send its next play, whether to the west or east of Greenland, and with present weather reporting facilities, he may not know until the storm is upon him.

We know the Great Circle course, and we know it better than other ocean airways because men have flown it and ships from which weather reports come traverse it. Because we know it perhaps, there is no mention of it as a probable airway for the immediate future.

The range of planes and the present ability of planes to carry a load a long distance non-stop over water is outside the province of this discussion, but to the weather man's point of view, the course that appeals most is that following steamship lanes. Williams and Yancey followed this course out to the ocean corner some 1,440 miles from New York and then paralleled the Bermuda-Azores route to the Spanish coast. Assolant, Lefevre and Loti followed the same course. The distance is shorter than the Arctic and Azores lines, and less dangerous than the Great Circle. Moreover, planes carrying radio need never be out of touch with ships and are quite likely to be within a few hundred miles of ships or land all the way across.

While we are speculating on ocean flying, it might be well to consider the efforts now being made by naval architects to construct a floating flying field after the design of Edward R. Armstrong. One of these seadromes, I understand, is to be located experimentally between Bermuda and New York. This development will be especially interesting to watch. Even if the seadrome should not be the best of landing fields, the mere fact of its existence would remove a great deal of the mental hazard that any pilot flying over hundreds of miles of water must face.

AIR—HOT AND OTHERWISE

(*Continued from page 40*)

on the same research. This would give $200,000 per research item. Allowing for those research projects not yet completed for which no reports have yet been published and allowing also deductions for other expenses of the N.A.C.A., we are certainly justified in estimating that more than $100,000 has been spent for each research undertaking. Since 1925, and until 1930, the annual appropriation for the National Advisory Committee for Aeronautics has been approximately $500,000. This year it was increased to $1,508,000. No one can claim that during any one of the last four years more than five research problems have been finished and the results made available to the public. One hundred thousand dollars per research is perhaps too moderate an estimate.

It is pertinent to ask whether really useful scientific results have been obtained, and if not, to inquire about the reasons why research so liberally supported failed to furnish an adequate return. This sum cannot be considered exorbitant if valuable results have been obtained from it.

If we make a more detailed analysis of the N.A.C.A.'s research of the past ten years, we find that it can be classified into wind tunnel research, free flight research on

(*Continued on following page*)

(Continued from preceding page)
actual airplanes, and engine laboratory research.

In the engine laboratory, tests have been conducted with a view to improving the efficiency of gasoline aircraft engines by the choice of the best compression ratios, richness, and mixtures, and the like. That work would be valuable if important results had been obtained, but we doubt whether, lacking this research, any one existing engine would be worse. To say the least, this study and experiment has not been of a scientific nature. In addition, the Diesel engine was studied, likewise not a scientific or new phenomenon, and no tangible results were achieved, except possibly in the case of the spray research with solid injection.

The free flight researches gave valuable information concerning the maximum accelerations and maximum pressures occurring in maneuvers. Also some practical information regarding the ice hazard and similar subjects was obtained. Apparently the only fact demonstrated in the study of the supercharger was that such a device increases the available horsepower, and that was known before. This can hardly be considered an outstanding success. On the whole it can, nevertheless, be said that the free flight research has been the most beneficial conducted by the N.A.C.A. At the same time it can be said that no free flight test has been a scientific test nor dealt with investigation of fundamental phenomena of nature. Test flights conducted over a period of ten years, with the aid of good instruments, cannot but yield some valuable information, especially at a time when flying is new, but they are not likely to advance fundamental science.

The class of wind tunnel research should correspond most to the description "scientific." Therefore, we ought to consider it in more detail in order to find there at least some of the promised scientific work. In this category the pressure distribution work of the N.A.C.A. showed only that wings should be rounded at the tips, which was known before, and which could be and was demonstrated in the course of natural industrial development. Merely to make pressure distribution measurements is not scientific. We are sometimes inclined to believe that it would be better for wind tunnel research if it were more difficult to do this kind of work; an abundance of patience is necessary but not much creative mental effort. The results are not of great practical value, because they are made under steady wind tunnel conditions, whereas the largest pressures occur under unsteady flight conditions. For this reason, the pressure measurements made in flight tests are much more valuable.

In addition there have been wind tunnel tests on complete airplane models, and drag measurements on airplanes and airplane parts. This research cannot yield new results of general value, and is therefore outside the scientific research the N.A.C.A. is charged to undertake.

During all of the ten years, much time and effort has been spent on a series of tests undertaken to standardize wind tunnels throughout the world. This work showed merely that different wind tunnels give slightly different results and that these differences cannot be predicted—which facts we knew before. Tests referring to wind tunnel technique are secondary anyhow. Someone has claimed that all wind tunnels could continue to do research even if no airplanes existed. They could, but we would not accept such work as useful unless science had been advanced.

(Continued on following page)

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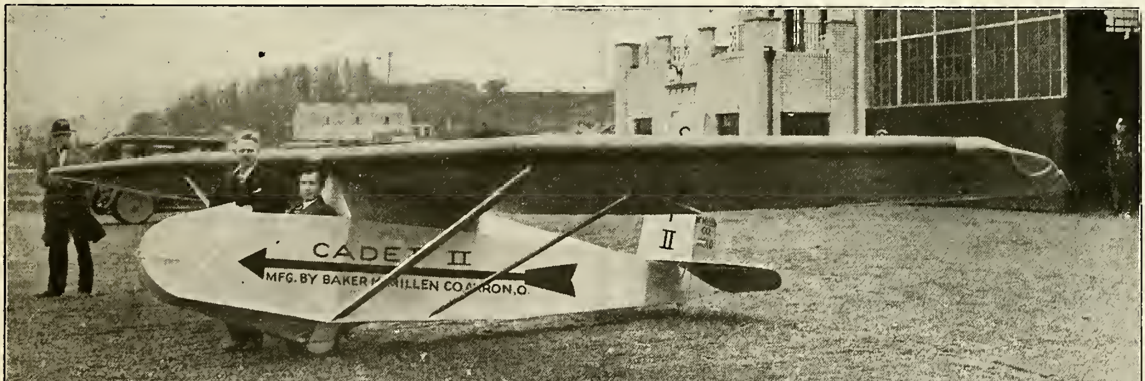

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WRITE FOR INFORMATION PIONEER BUILDERS OF COMMERCIAL GLIDERS (ESTABLISHED 1874)

(*Continued from preceding page*)

Propellers have been investigated and found to possess a certain thrust and torque. Interesting, but again not scientific progress, not even technical progress.

We come at last to the research having most of the scientific element in it—that dealing with the rotating cylinder. This stirred the imagination when the first tests were made and showed undreamed-of lifts. Right now, a very prominent manufacturer is making experiments along that principle. Unfortunately, the first tests along this line were not made by the N.A.C.A. On the contrary, the N.A.C.A. refused a suggestion in 1921 to measure this phenomenon. Several years later, it did repeat measurements made abroad without adding one new thought or result.

The Autogiro is the most painful subject in connection with the N.A.C.A. research. The N.A.C.A. had the priority in this new and perhaps most important invention of recent years. Autogiro models were investigated in 1922. It is hard to believe, but nevertheless true, that these tests were never published in a Technical Report. Five years later, after the practical value of the Autogiro had been demonstrated abroad, the results were published in mimeographed form, giving evidence of an opportunity to contribute to scientific progress which was woefully neglected.

In the investigation of auto-rotation of wings, it was demonstrated that, in a wind tunnel, wings can be made to rotate like windmills. This has hardly any bearing on or connection with the spinning of airplanes. It can hardly be called a research, but rather only making pretense of research. No airplane designer gives any attention to such tests, and science rejects them entirely.

A study of boundary layer control is on the program of the N.A.C.A., according to its statement, but no report has appeared in print on the results and we have not been apprised of any progress. This should be the most important subject of the work, but in fact hardly anything seems to have been done except the repetition of some work abroad.

Finally there is the wing section research. This is the only line in which the N.A.C.A. has contributed to aeronautics by way of its own experimental research. The M wing sections were developed by the N.A.C.A., in its wind tunnel, and at least two of them have been adopted in practice, being considered superior to older ones. Accordingly, the N.A.C.A. report for 1924 (page 50) says: "satisfactory progress has been made in the science of aerodynamics during the past year. . . One important result of wind tunnel investigations has been the development of a number of remarkably efficient wing sections of adequate thickness for economical structures. *It is desirable that this development continue substantially along the present course.*"

This was indeed desirable, for the investigation was intended only as the first and preliminary step of a more systematic research. Much better wing sections were expected from the next series of tests, as the report indicates (page 59), "It is believed that a fruitful field for research lies in the determination of these sections which have a stable flow with good aerodynamic properties." In the interim, however, there has been no evidence of further work and the M section research, so admirably begun, has never been continued.

We do not believe that we have overlooked a major research item of the N.A.C.A.; we are certain we have not

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overlooked a successful one. The N.A.C.A. was officially awarded the Congressional medal for its low drag cowling. Apparently, even the friends of the N.A.C.A. consider this the most outstanding of the research projects completed. Yet, in the true sense, this cowling work was a development rather than an original work. Moreover, because it had reference to special airplanes and engines, it cannot be regarded as having general value. Therefore, it cannot be considered scientific work. It does not involve the study of new and fundamental phenomena of nature. Its doubtful value in this connection is clearly contrasted with the research of similar aim—though along entirely different lines—carried on at the same time in England. The Townend Ring is definitely superior to the N.A.C.A. cowling. It is the outcome of strictly scientific research carried on with scientific spirit, involving the systematic exploration of new and fundamental phenomena, and incurring relatively little expense. It represents more brain and less expenditure than for the N.A.C.A. cowling research.

The results of the N.A.C.A. experimental research are not, in our opinion, an adequate return for the money spent. There is hardly one research project of scientific value, and only a few of technical value. There is an enormous gap between the principles of research laid down and those applied.

It cannot be denied that there is keen feeling of disappointment throughout the industry about the outcome of the N.A.C.A. research. Every year the industry gathers at Langley Field to acquaint itself with the latest results of the research going on, but every year it is presented with stone rather than with bread. New laboratories and instruments are exhibited but no new results worth speaking of.

Responsibility for the N.A.C.A.'s failure to make substantial contributions to aeronautic science does not rest entirely on the organization itself. General supervision of the research undertaken is in the hands of committees which are composed of members serving without compensation. Under these circumstances, they cannot give much time to this research; and after all, they are not to be blamed for its shortcomings. Scientific knowledge cannot be amassed by a committee any more than an opera can be written by a committee. The capable and patriotic members of the several research committees feel that they can give best service by keeping their hands off, by assisting with advice and suggestion only, without showing too much initiative.

The real responsibility would seem to rest, therefore, upon the director of research. Is he one who knows "the problems and the methods used for their solution"? We fear not. But then it must be remembered that this director exercises the direction of the research from a distance of 200 miles, and as an auxiliary duty only. His primary duty is that of an executive. In the first place he must practice diplomacy and exercise organizing talent; only secondarily need he exhibit any scientific spirit. Most of his direction of the research is done over the long-distance wire, or on occasional visits. These facts, together with his normal duties which stand in distinct contrast to the duty of research supervision, and require entirely different capabilities, make it plausible to believe that the director of research is not in a position properly to discharge his duty. As one important reform that will improve the present conditions, we suggest that the Langley Field laboratory be separated

(*Continued on following page*)

WAY ABOVE THEM ALL!

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(*Continued from preceding page*)

entirely from the Washington political office of the N.A.C.A. and be put in charge of a capable research engineer who would be fully responsible for the research and for it only.

As it is, the true initiative must come from the local head of the laboratory, and from the heads of the single divisions. We expect most from the aerodynamic sections. It is now a fact that both positions, the head of the L.M.A.L. and of the aerodynamics division, have been occupied in recent years by men who are decidedly not research engineers at all. Neither of them has ever contributed anything to science, and neither of them expects to do so. They are mere routine engineers, and hardly that; they are mere bureaucrats, signing letters and unwrapping red tape.

This brings us to the question of the N.A.C.A. staff. Friends of the N.A.C.A. have claimed that the staff has suffered great losses because the industry has induced its best men to leave by offering them lucrative positions. This does not sound probable. In the first place, a capable research engineer does not leave his work if he has found favorable working conditions, and is progressing satisfactorily in his work. The fact that nearly all good research engineers have left the N.A.C.A. constitutes in itself a reproach to the management. From inside information we know that most engineers left of their own initiative, because they were dissatisfied with the management. They are now employed in industry, and most of them did not leave as friends of the Committee. During these ten years, the head of the laboratory at Langley Field has changed four times, and two and a half years is about the average time the engineers used to stay. There must be a reason for this state of flux in the personnel. Most of the research engineers are young graduates, and the few older men who have stayed with the organization are for the greatest part less capable than those who left. Jealousy and petty politics have always played too great a part in the activities at Langley Field. The spirit of research and scientific work was never really encouraged by the management. Nobody can carry on research work successfully if he is compelled to devote a great part of his time to fighting for the coöperation of others to which he has a right, and fighting off the aggressiveness of his colleagues. The failure of the National Advisory Committee for Aeronautics is the failure typical of so many public organizations. There is no effective check on what is accomplished. If the results of the N.A.C.A. could be computed according to their worth in dollars and cents, the Committee would long ago have been bankrupt. But it is not a money-making organization; it is a money-spending organization. That leaves much energy free, and unfortunately the conditions in such a case are favorable to the survival of those most unsuitable for carrying on scientific research.

The activity of the N.A.C.A. has become a mere building of new laboratories without distinct ideas of what to do with them after they are built, and it has become a mere weighing and measuring of less value than the weighing of a grocery clerk. No concerted efforts are made to advance science; no efforts are made to apply the results of the tests to any logical system, to digest them, and to interpret their significance in the sum of general knowledge. The truth is that the tests cannot be interpreted that way be-

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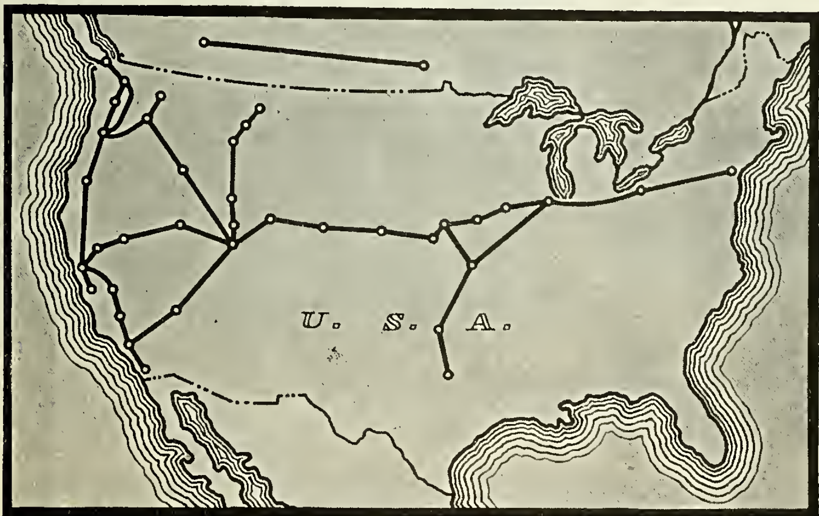
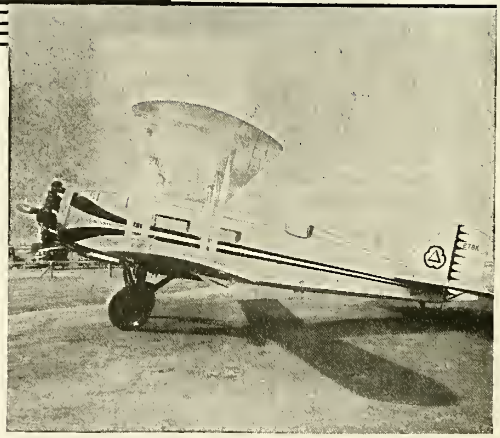
EVERY DAY ADDS 25,000 MILES to the Boeing mail-plane record!



Left—Eight American and one Canadian mail-passenger lines flying on routes shown at left use Boeing equipment.

Below—Hornet-powered Boeing "40" of Empire Oil Co.—one of a number of corporations which have purchased these dependable, economical planes.



NO PLANE ever built has outlived the famous Boeing "40" in continuous service. Already several "40s" have flown 3,000 hours on the transcontinental route and are still "going strong." Nineteen of the twenty-four put into service three years ago are still on the job seven days a week. The real cost of an airplane is the cost per hour of its flying life.

The price of the 40-B4 (Hornet-powered) has just been reduced to $22,500. Planes are completely equipped—no extras to buy . . . Ask for detailed performance figures.

These pioneer air lines use Boeing planes: Aviation Corporation, Barnes and Gorst, Boeing Air Transport, National Air Transport, National Parks Airways, Pacific Air Transport, Varney Air Lines, Western Air Express and Western Canada Airways.

40-B4s ARE AVAILABLE FOR IMMEDIATE DELIVERY.

BOEING
AIRPLANE COMPANY
SEATTLE, WASH.

A division of the United Aircraft and Transport Corporation

(In Canada: Boeing Aircraft of Canada, Ltd., Vancouver, B. C.)

(*Continued from preceding page*)

cause the program has not been guided by scientific reasoning. Weighing for weighing's sake is not scientific research, but at the best a kind of indoor golf.

We urge that radical changes in the management be made with the view to improving the conditions to the end that real and honest talent may be attracted to the N.A.C.A. Only then will there be some prospect of an intelligent use of the research equipment and a reasonable return for the money spent.

Let's devote a period of thought to wondering if these large appropriations devoted to the N.A.C.A. have served, are serving, or will serve the industry.

Let's hope that Congress, yes, and even the President of the United States, will give consideration to the self-same subject.

Let us spend money, certainly—no detail of aviation should be stinted—but let us have men in charge of its expenditure who will see to it that the money which we spend shall count.

CYDE-LIGHTS ON THE NEWS

(*Continued from page 39*)

or P.R.M. for short—and he's invariably short—of ideas. "Nothing happened, and that's the devil of it. I haven't a thing to send out, and I'm desperate. I'm desperate, I tell you—desperate!"

His voice rises to a scream and he is about to hurl himself from the window and end it all when the pilot says, "Hold! Stay! Wait! Stop! Did you tell 'em about those outside loops I did with a passenger? Did you tell 'em about that old woman of ninety who could barely walk and had to be lifted into the plane—and when she came down again she was in her second childhood? Did you tell 'em about the little boy who was deaf and dumb, an' I took him up and spun him down from ten thousand, an' when he landed he said he was still deaf but wasn't dumb enough to try it again? Did you tell 'em——?"

"No, I didn't!" yells the P.R.M. happily. "But I'll tell 'em now—I'll tell 'em now!"

And he does—that's the pity of it.

AND now, my six patient and long suffering friends, if you're still with me you understand just how and why the nit-witted news about aviation gets into the papers. Don't blame the papers; don't blame the editors; don't blame the reporters. Least of all blame the P.R.M. He feels he must live. Blame aviation's own insane yearning to see itself in print, no matter how foolish and stupid the print may be, no matter what unhappy effect it may have upon a reader.

What we have here is one of those vicious circles you hear about. Aviation wants publicity so the public will hear about it and use it. In order to get publicity, it must make its releases "interesting;" to make them interesting they must be "different" or "amusing;" and when they're made interesting by the description of some silly prank, the thoughtful reader comes naturally to the conclusion that a large part of aviation is run by a bunch of people with childish intellects.

The reader may say to himself, "Well, that's very amusing, but the sort of people who go in for that kind of thing are hardly the ones I'd trust myself to in the air, or even along the ground. I'd better stay out of those airplanes until they get some grown men running them." The grown men, meanwhile, are plugging along with their sane, quiet, aerial service, saying little about it. The vociferous members of our little group are getting into the papers, usually with something foolish; and the sensible ones are staying out. Thus in the public mind the vicious circle has been completed: aviation has got across its publicity; the publicity was harmful; and the public remains on the ground.

A partial solution would be to get all the publicity we can for our useful service, and when we can't get it, to remain silent. Many a noble reputation for wisdom has been built up merely by saying nothing; and a fool seldom is recognized as such until he opens his mouth.

TO encounter nut publicity emanating from the worried brain of some harrassed commercial operator, forced as he may be to do something to attract the public to his field, may be somewhat distressing, but at least it is partially excusable on the grounds of the operator's dire necessity. No such excuse could be offered in defense of the great United States Navy when it feeds to the press a publicity release that could be described adequately by no word other than asinine. In fact, the heroine of the release is an ass, so the word is used advisedly.

But let me quote the headlines: "ANACOSTIA FLYING ACROBATS OFF FOR STUNTING AT TRENTON. Crack Navy Pilots, Accompanied by 'Orphelia,' Santo Domingan Burro, as Mascot." The release, in part, is as follows: "Accompanied by an infant Santo Domingan mountain burro, three crack Navy acrobatic pilots, composing the famous Anacostia acrobatic section, took off for Trenton to fly in the aerial demonstration there to raise funds for the American Legion 'Cathedral of the Air,' to be erected at Lakehurst. Orphelia was flown to Washington recently from Santo Domingo. . . . Orphelia, according to the Navy, holds all world's records for long-distance flying by jackasses or beasts of like breed."

The phrase "according to the Navy" indicates that this was an official Naval press release. It was accompanied by a photograph (reproduced on page 39) showing Lieutenant Storrs and his companion. In the rotogravure section, where it appeared to delight the eye, only Lieutenant Storrs was named, so at first I didn't place Orphelia. I naturally thought Storrs was flying one of the old line Admirals somewhere, and that they had forgotten to name the Admiral. Then, in the news section, I learned that the jackass was merely a friend of Storrs who was accompanying the flight in the interests of Naval publicity—a role that suited her admirably.

In the interests of aviation, however, it would be well

(*Continued on following page*)

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to transfer Orphelia to the heavy sea-going part of the Navy. Wandering around the quarter-deck of a battleship would also, I believe, be more pleasant for the little jackass. Munching her hay contentedly with the other Admirals, Orphelia would feel that warm glow that can be experienced only when one is among understanding friends.

TURNING from the bold publicity doings of these great, rough seamen, it is refreshing to enter the chaste and cultured atmosphere of soft femininity. Here I must tread softly, gently, placing my elephantine feet carefully between the bric-a-brac of cherished illusion. I must not, for instance, even hint that the dear gals are in aviation for publicity purposes, and that if they never got their names or their faces in the papers that they wouldn't be in aviation at all.

For instance, I read that a young lady has won the world's looping record for women—and doubts assail me. Just why, and for what purpose, was she looping? If aviation was advanced, how far was it advanced—and in what direction? According to the direction in which the young lady had been flying in those loops, the aeronautical progression was not ahead, but around and around, after the manner of a kitten chasing its tail. Just what was the sweet thing after, anyhow? I know it couldn't have been publicity.

THE tired, reeling brain of the Public Relations Man has of late been digging up a new brand of publicity. And, as I say, don't blame the poor old P.R.M. for it—he feels he must live—even if some of the rest of us fail to see the necessity or even the desirability of his continued sojourn among us. Of late, he has been invading the nursery for news items

For instance, a publicity man of a flying school handed us the following: "An unofficial altitude record for student pilots in a training plane was established by Pernicious Anaemia when he flew a Fleet biplane to 16,100 feet"—and so on, and so on.

Of what benefit is it to aviation that some simple pupil has managed to climb to 16,000 feet, by the exercise of no more effort and skill than merely holding back on the stick? What sort of a doltish "record" is that? Of course, there's no harm in a release of that nature—it's merely silly and meaningless.

But it leads other desperate P.R.M.'s to worse extremes. For instance, the gentleman at another school whose duty it is to interest the public in aviation sent out the story of a pupil, an Indian, with five hours' dual, who when sent solo proceeded to execute a series of loops. The press story was full of admiration for the "courage" of this Indian, and described his ill-advised antics at some length. To make matters worse, Lowell Thomas picked it up and broadcast it over the air on the *Literary Digest's* news minutes—thus spreading the glad word to perhaps several million listeners.

If I had been the instructor of that Indian—which I was not, or the Indian would have done no loops—the broadcast would have concluded, "When the Indian landed and taxied to the line to receive the congratulations of his affectionate instructor, Cy Caldwell, that kindly old gentleman reached into the cockpit, gently hauled the looping pupil out by the scruff of the neck, held him at arm's length, and administered several loving and paternal and accurately placed kicks in the pants. The affectionate old instructor, after jumping up and down playfully on his pupil's now extended form, informed that brave young gentleman that he was grounded for thirty days to give his air-excited brain time to cool."

Unfortunately, however, I was not the instructor, so the broadcast concluded on a warm note of admiration—leaving the public to believe that this sort of foolishness is greatly admired in aviation. And the public's reaction must be that many of us in aviation are no more than over-bold idiots, and not to be trusted by sane people.

I QUOTE from the first-mentioned school release again re that altitude "record." "The record was observed by a governor of the N.A.A. and while the N.A.A. doesn't recognize records by student pilots, it is believed this one will start something among flying schools over the country."

I hope it does start something—though not what the P.R.M. infers. I hope that it—coupled with what I am saying here—will start a movement for more sanity in press releases and less ill-advised attempts to capture publicity by exploiting the antics of some pupil, thus perhaps giving him a swelled head, making him overconfident, and further stimulating him to show off—to the end that he may more readily and easily fit himself to get into trouble.

This particular "altitude record" was harmless enough, but as the P.R.M. says, "it is believed it will start something among flying schools." The thing to start among flying schools is the comparatively new idea that aviation is a *business,* concerned mainly with transportation, and not with the childish hope of getting your name or your face in the papers for some meaningless prank.

AS a contrast to the above, it is heartening to be able to print this press release by the Curtiss-Wright Flying Service: "Declaring his organization 'is in business to provide flying instruction and airplane transportation,' and that 'racing has no connection with the commercial operation of airplanes,' Major E. H. Brainard, president of Curtiss-Wright, issued the following memorandum to all personnel under him:

"'After carefully considering the expenses, rewards and risks involved in racing, it has been decided that this organization will not participate in any airplane races.'"

Slowly but surely this aviation game *is* becoming a business. Believe it or not.

SOMETIMES when I get blue I turn to the Navy for cheer. And almost invariably it has done something that causes a sunny smile to break forth and change the savage contours of my ugly mug.

Recently, for instance, it had a \$200,000 fire on one of its battleships—I forgot the name of the tub. But no matter. A battleship by any other name would sink as fast. Now, a \$200,000 fire is quite a large fire, and certainly quite an expensive one. And how do you think it was caused?

Well, apparently it was caused by a phonograph needle. It seems that some playful wag—probably one of the more juvenile Admirals or one in his second childhood—stuck phonograph needles in the insulation of some electric cables. This caused the fire!

Now, if a phonograph needle can do \$200,000 worth of damage to a battleship, why go to the expense of building aircraft to sink them? Why not simply get an under-cover army of phonograph-needle-pushers and send them to sea.

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A couple of dollars' worth of needles, or even a handful of used ones, should sink the whole fleet.

I say used ones, because obviously they are the more deadly. Consider, for instance, a needle that has spent its reproductive life playing one of those hot mamma records—a mere touch and whatever it touches becomes red hot. Or a needle that has played records made by crooners—electrolysis will immediately set in and rot the cables. Better still, get a needle that has played a recording of one of Borah's speeches—and up goes the battleship in a gale of wind.

SPEED

(*Continued from page 37*)

welcome new developments that tend to decrease the clutches of time. In my own experience, I have found it delightful and fascinating to be able to take off at Los Angeles in the morning and fly to New York in time for a dinner engagement there, 2,510 miles away as I have laid the course, negotiated in an elapsed time of twelve hours, twenty-five minutes and three seconds, with three stops for service and brief rest which consumed forty-five minutes.

What a contrast such high speed travel is to an automobile trip I made this last summer to visit my good friend Dick Mestres, captain of this year's Princeton football team! I spent ten hours driving some 300 miles, and the only stop I made was to change a tire. It was necessary to keep plugging right along in the automobile to average thirty miles per hour—yet, in the twelve-hour jaunt from coast to coast, I averaged well over 200 miles per hour and found it not only faster, but less fatiguing.

Traveling through the air at 200 miles per hour has additional thrills, too, which cannot easily be expressed in words. The change of scenery is just rapid enough to be pleasant. One gets away from the feeling of standing still; that feeling that many laymen have expressed as "not going anywhere." Hurling through space against time at such speeds is interesting. One actually takes into consideration the action of the solar system. What a thrill to realize that man is showing marked gains on the travel of the sun!

From Los Angeles to New York, there is a loss of three hours of sunlight, and when one can travel from that coast to the Atlantic Ocean between the first morning glimpse of the sun's rise on the Pacific and shake hands with his friends in New York prior to the setting of Old Sol, it is possible to look at the sun and smile and thank him for his assistance, even though he has apparently been trying to run away.

In going west, we are chasing him all day long and looking into his face with a determination which science has given us to catch up enough of his valuable time to play a round of golf on the West Coast before he sets. Indeed, my friends, these are thrills which are within oneself and can hardly be explained.

When clouds are abounding and storms threaten, the fast airplane is not endangered as much as the average airplane that travels the air lanes today. It can run away and circle these obstacles. If the storm area is of a more general nature, and it is necessary to go through, the combatting of soupy weather is not nearly as tedious to the pilot of a speed plane as to the flier in an ordinary ship.

Nor are head winds such a handicap to the airplane which travels at 200 miles an hour. They are, of course, bothersome and reduce the speed, but the proportion is not so great as with a small airplane with less speed. As for tail winds, the expression "riding on air" certainly

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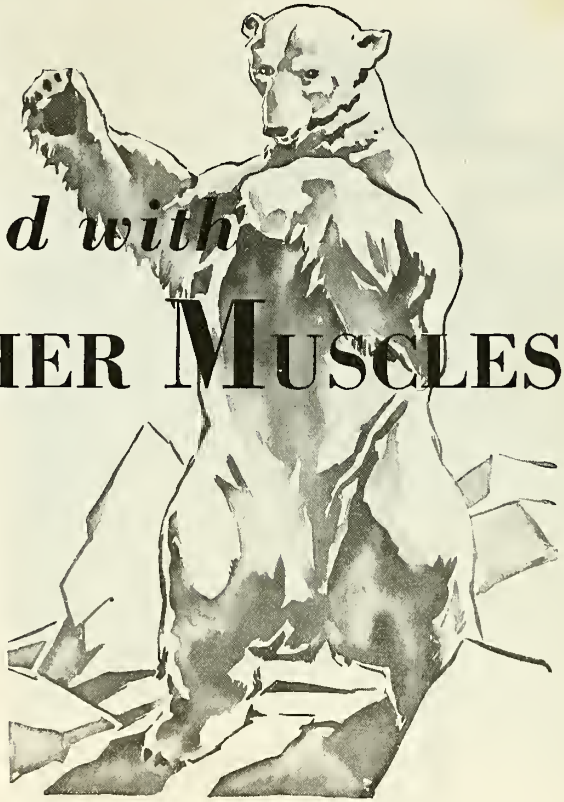
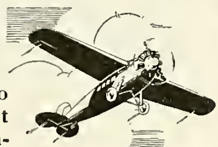


Powered with STONE-CRUSHER MUSCLES

But its safety really lies in the extra sensitive nose, ears and eyes



POWER is much more essential to the airplane, of course—but flight is surer, *doubly safe*, where extra-sensitive warning apparatus is ready with instant advice.

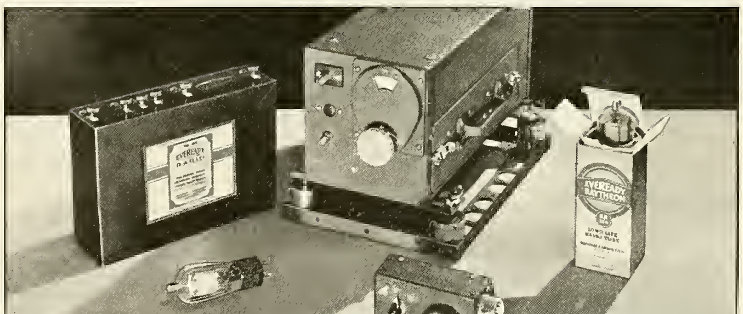
Radio-safety equipment has already saved the lives of many fliers. Through its protection of costly planes, radio may come to mean survival for many air transport companies.

Aircraft Radio Corporation engineers are pioneers in the development of radio-safety equipment. They were first to perfect radio-beacon receiving equipment and shielding for standard spark plugs. This shielding is standard for Pratt & Whitney engines and is the only one commercially available which permits the use of plugs best adapted to any particular service. A. R. C. solved the problem of a built-on antenna with a receiving set many times more sensitive than ever before, smaller in size and with a range of two hundred miles or more.

A. R. C. engineers want the completed products of their research and experimenting to be the finest that can be made at any price. They specify every part of it and choose the manufacturer best fitted to produce it. So this popular receiver is manufactured under A. R. C. licenses by Stromberg-Carlson and is powered by Eveready "B" Batteries and Eveready Raytheon 4-Pillar Radio Tubes.

You need radio insurance! A.R.C. provides it. A competent engineering staff, modern ground and flying laboratories, instrument and installation shops and a spacious hangar are at the service of commercial organizations, government agencies and owners of private planes. Write for booklet and ask to be kept posted on new developments.

A. R. C. is the designer, sales representative and installation agent for all Aircraft Radio Equipment manufactured by Stromberg-Carlson Telephone Mfg. Co., and National Carbon Company, Inc. Inquiries are invited, or, pay a flying visit to A. R. C. airport, three miles north of Boonton, New Jersey.



AIRCRAFT RADIO CORPORATION

SUBSIDIARY OF RADIO FREQUENCY LABORATORIES, BOONTON, NEW JERSEY

(*Continued from preceding page*)

finds an appropriate application.

What is the effect of speed on engines? Without commenting too much in detail, I should like to call attention to the more or less obvious fact that, with a cruising speed of around 200, there is much less labor on the motor for distance traveled. Consequently, there is greater economy of operation. More miles per hour with the same r.p.m. to gain the distance is also a safety factor. I have flown my little ship now nearly 200 hours at an average speed of 195 miles per hour. This includes all flying of every description, but figured on a mileage basis, it represents a straight-line travel of 39,500 miles, almost twice as much distance covered in the same number of hours as the average airplane. And for that distance it means one-half of the motor labor and time which would have been required with the other type ship. Obviously, I have been able to operate at almost one-half the cost per mile.

It may be argued that these figures prove nothing because I have a single-seater ship which may be considered by some as a purely racing type of airplane. According to my interpretation, a racing airplane is one which is limited to closed or straight-away courses or restricted areas where landing facilities are available at all times. Such an airplane is a laboratory for engineers to study the practicability of their theories before applying them to military or commercial aircraft for service uses. The airplane I fly can hardly be termed a racing airplane, for it is capacble of going anywhere any other landplane can go. It carries sufficient load to satisfy my needs and carry me about the country so that I may more rapidly handle my duties as superintendent of the aviation division of The Texas Company.

There are some airplanes of commendable design which travel between 175 and 190 miles per hour at full throttle and carry from four to five passengers. It is to be regretted that they have not been so popularly patronized by the industry itself. The objections are what I mentioned in the beginning of this article; namely, the belief that these planes have excessive landing speeds, a belief which I am thoroughly convinced has been over-stressed and misunderstood.

The one great advantage that the airplane has to offer is rapid transportation. Without it, I do not see where air transportation, or air mail, express or freight, has much to offer in competition with well-established and recognized forms of transportation on the ground. When the business man can be shown that there is actually a saving of time over the air routes, especially between the big metropolitan centers where the greatest amount of revenue can be expected, then, I believe, the progress of aviation will be on a firm footing with some real definite prospects for sound financial development. Obviously, these increased speeds must be accomplished without any increase in rates. In fact, the present rates must eventually be reduced even further. I do believe, however, that by fixing attention upon the former requirement, the latter factor will more readily take care of itself.

If any of the cross-country speed records which I have made offer incentive to others to excel, I shall always feel my efforts have not been in vain, but will bring real results. There is no object in flying from city to city for the mere purpose of establishing a record unless the fact that it can be done is recognized as an advancement to aviation. A record, of itself, is worthless unless it can be pointed out as a definite marker at which all other commercial aviation enterprises can aim as a goal for logical daily operation.

WING AIR FLOW

(*Continued from page* 50)

the wing, but that at greater distances the summarized effect of all wing elements and their distribution along the span predominates over the effect of the contours and overshadows the profile details. The profile flow is chiefly a local flow which explains the relations referring to each wing portion or wing element. On the contrary, the influence of the span view flow on the profile flow as a whole is perceptible near the wing in a very broad and general way only, but it does not materially determine the character of the velocity variation or the shape of the streamlines in detail. The opposite is true at some distance from the wing. The profile flow, with the chord as its small base, fades out quickly as we turn away from the wing. The span view flow, with its much larger base, persists and becomes more predominant. This contrast is intensified by the different natures of the two flows; the profile flow fades out gradually in all directions, but the span view flow persists in the rear direction.

This leads us to a third contrast. The profile flow constitutes a wave moving with the wing, but the span view flow constitutes a wake behind the wing. The reason for this essential difference can be understood from pure geometry. It is founded on the fact that all upward and downward flow of the air throughout space is perfectly balanced so that there is always as much air flowing up as flowing down. If it were otherwise, there would result spaces empty of air and regions overcrowded with air. This holds for the profile flow and for the span view flow alike, but leads with both to different consequences. The profile flow, consisting of a throwing down of the air has, accordingly, a down component behind the wing. There must therefore be a corresponding up component in front of the wing, for in this flow there are no other regions for the upward motion. The flow is quasi-symmetrical fore-and-aft. The air very far in front has no vertical component; neither has the air far in the rear. The motion dies out in front and rear, and on top and bottom. The vertical component is zero far forward. It has an upward maximum some way ahead of the wing, becomes zero at the wing, reaches a downward maximum some way behind the wing and becomes zero very far behind. A typical flow of this kind is represented in the accompanying illustration on page 50.

The span view flow likewise possesses a down component behind the wing. But the regions for neutralizing this down motion are now sideways. To the left and right behind the span, the air has upward components. Since this wing action is directed sideways, there is now no reason for a symmetry fore-and-aft. On the contrary, the motion starts from rest, reaches its full strength behind the wing and persists there because there is nothing to destroy it again. A wake built up under the action of the wing pressing down, through the profile flow wave as the local agent—this is the mechanism of the creation of lift and at present the picture of the resolution of wing air flow.

The two flows are thus seen to contrast with each other by their function. The profile throws down and thereby creates lift. The wing area, through the profile, possesses a lift creating capacity. This capacity remains inactive unless complemented by the lift sustaining capacity of the

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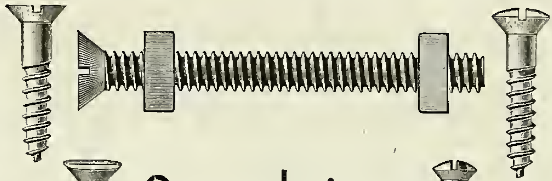

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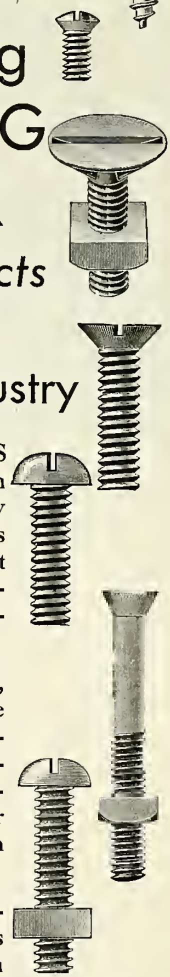

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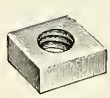

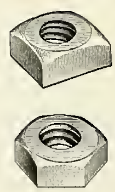

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span. The air, in its inherent tendency to preserve so far as possible its original state of motion, is prevented from becoming wholly profile flow by assuming the span view flow and is prevented from becoming wholly the latter by assuming the profile flow, comprising both flows in such proportion as to undergo the least change of its state of motion consistent with the geometrical conditions. To increase the spread of the span is to make the shortcut around the span more inconvenient. In consequence, all other factors remaining equal, the span view flow becomes weaker as the span increases. A larger chord, however, is associated with a stronger profile flow. The chord creates its flow; the span counteracts its flow. The action natural to the profile is reduced, not by the span, but by its failure to provide for complete lift sustaining capacity, which is never 100 per cent. There is always some air flowing by the sides. In the academic case of a span of infinite length there is no span view flow at all, for there is no region for lateral upflow. Inasmuch as the profile flow is then realized to its fullest possible degree, the flow becomes a pure profile flow.

This use of the term "pure profile flow" permits of still another contrast between the two flows. The profile flow can be said to constitute that particular pure profile flow consistent with the created lift. The difference between this pure flow and the actual flow is then charged to the span view flow.

The two flows contrast from the practical point of view also. The profile flow gives the lift, and the span view flow merely supports this lift, and rather imperfectly at that. The profile flow is the more useful of the two. Moreover, it is also the cheaper of the two; it costs nothing. The span view flow costs horsepower. It also takes horsepower, of course, to drag a profile through the air, but that is another matter, which does not belong in this chapter. A real potential profile flow has no drag and does not require any energy. It constitutes a mere reflecting of the air, whereas the span view flow is a deflecting. A baseball is reflected by a fixed obstruction such as a wall, but deflected when a bat is swung against it. With perfect reflection no transfer of energy takes place; the motion changes its direction but not its magnitude. With a deflection from rest to motion, energy is required to build up the motion. Dying out again behind the wing, the profile flow is able to maintain itself without energy supply, like a wave on the water. The span view flow constitutes the change from non-motion to motion, from rest to wake. New portions of the wake are always added, not like the tail of a cat which is dragged along unchanged, but rather like the exhaust of the automobile which, though continuous, is ever renewed. This requires a constant supply of energy, making itself manifest in a drag to be overcome, which we shall later know as the induced drag. The profile flow gives the lift, and the span view flow gives the drag.

Each flow is treated in a separate theory. The profile flow and its air forces are treated in the wing section theory. The span view flow and its air forces are treated in the wing theory, or theory of wing systems. Accordingly, the complete theory of the wing air forces consists of three parts; these two theories and their combination.

The separation of the two theories is so complete that either can be used by itself or in combination with other

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conditions. The wing section theory is employed for the study of propeller action. The theory of wing systems is employed for the study of helicopter and Autogiro action.

The complete wing air flow is decidedly a three-dimensional flow. Likewise the two component flows are in the strictest sense three-dimensional, but in a special way which makes it possible to reduce the problem to a two-dimensional one. Although the component flows take place in parallel planes, the flow in each parallel plane is not the same. Each by itself can, however, be considered as an element of a two-dimensional flow. The different profile flows in different vertical planes through the wing vary in accordance with the variation of the wing section along the span. The span view flow, though different in the various parallel planes, can be supposed to differ in intensity only, so that it is sufficient to compute one only, and that one as a two-dimensional flow. The resolution of wing air flow into its two component flows not only separates things that belong apart, but also considerably simplifies the mathematics involved.

For the practical application of the theory, it is not necessary to enter into the mathematics of the resoluion. Neither does it harm if preceding remarks about the two component flows remain somewhat vague after reading this article. They will appear more plastic and distinct when the two flows are considered by themselves and their practical application discussed. The division, as such, was a difficult and by no means obvious thought which even the best brains of the world discovered only after a long time. The division brings light into the darkness of the wing problem. For practical application, it is chiefly necessary to understand this division as a method, but not all of its details. By merely continuing with the study as presented in the forthcoming articles of this series, the reader ought soon to become accustomed to the procedure and grasp its meaning sufficiently well to derive the fullest benefit for engineering purposes.

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AVIATION AND THE TARIFF

(*Continued from page* 38)

value. As for engines and parts, several European countries are using American engines on locally fabricated planes for several of the European airlines.

We have more to fear from the growing producing capacity of foreign countries than from the effects of the tariff. France, the principal European exporter of aircraft, shipped during the first quarter of the current year $1,553,520 worth of complete aircraft to other countries as compared to fifty-six planes exported from the United States for a total value of $885,702. The existence of export duties and tariffs on airplanes is just beginning to be felt by the aeronautical industry. The United States is beginning to feel to a slight extent the effect of trying to buck the wall of protective tariffs, and in the long run, is certain to meet more resistance in its export business.

Whether the United States needs protection for the airplane industry to the extent of a thirty-five per cent duty is questionable. The industry is firmly established now. One of the very few good arguments that can be advanced in favor of a protective tariff is that it develops industries in their industry. It protects the novice while he is getting on his feet. But the industry is now estab-

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lished as a full-fledged going business, able to defend itself against all comers, and the tariff on airplane imports may really be unnecessary now. However, for a time at least, it is advisable to keep it as a levy upon airplane imports for the purpose of preventing foreign aeronautical products from competing with the home products. The purpose of a protective tariff is to affect prices—to increase prices or to keep them from falling—and it is serving its purpose now.

Despite legislative handicaps here and abroad, the airplane industry in typical American style will re-double its efforts to retrieve business. Even now it is laying plans which will offset the new problems in the export field. That American planes, despite high tariff barriers, are able to find sales in many foreign countries in competition with the foreign home products and European products, is indeed a striking evidence of the great productive effectiveness of the American aircraft industry.

THE FLYING DOLLARS OF KANSAS

(Continued from page 42)

fornia has bought less than two times her luxury purchasing power quota as compared with the seven-plus figure for Kansas. At the latter's ceiling California should have 4,867 airplanes.

Next after the District of Columbia and Nevada comes California in the matter of relationship between the number of incomes per capita for the state and the number of incomes per capita for the United States, and in the matter of large incomes she is beaten only by New York.

New York's relationship in the matter of "all incomes"—according to the *Editor and Publisher* market guide from which the figures were obtained for percentage of consumer buying ability in the luxury class and for the relationship data—is stated as 168; and 242 for "large incomes" (those over $10,000). The Empire State ranks next to California in the actual number of planes in existence, but shows but 52 per cent, or 1,148, of these she should have on the basis of her buying ability—and on the Kansas basis her planes would total the perhaps astounding number of 16,114—more than twice what Pennsylvania should have, the next largest theoretical owner on the Kansas plan. California has but to quadruple her present number to make more than the Kansas rate, while New York's ratio is as one is to 14.

Figuring state by state, there is Arizona with her 35 airplanes. The second column of the tabulation shows these planes in per cent of those for the entire United States, or 0.35 per cent. Her consumer buying ability in the luxury class is shown in the third column as 0.13 per cent of that for the United States. It is obvious she bought beyond her speculative quota, according to the luxury buying theory, by 270 per cent, as shown in the sixth column. Columns four and five show the relationship between the number of incomes per capita for each state and the number of incomes per capita for the United States. The first of these two columns shows this relationship for "all incomes" and the second for "large incomes" (over $10,000). The last column shows the airplanes Arizona would have if she bought at the Kansas rate of 7.38 times her consumer purchasing power in the luxury class.

And so on! Comparisons, ratios, percentages and the state of "air-mindedness" may be figured and conjectured *ad infinitum.*

How can the sales organizations make Kansans out of the inhabitants of the 47 other states? "On what meat does

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Caesar feed that he hath grown so great?"—or something like that.

Kansas has her airplane factories but so have Arkansas, Missouri, California, Michigan, Colorado, Delaware and many other states. Perhaps agricultural time is more highly valued than that of the industrial magnate; or can it be that the farmer overlooks his broad acres from the air?

Or is it the scenery? Massachusetts will claim there is nothing to compare with the fall foliage on her mighty hills. Certainly the "enlargement of vision and awareness of geography" should be of as much interest to Pennsylvania as to Kansas.

It can't be the unemployment problem in the face of the figures on income. Regard the backward state of New York with its large incomes 2.42 times the United States average as against the less than one-third for Kansas.

One can imagine that the farmer might want to get into town a hundred miles or so away on Saturday nights and the airplane would serve him well. Still one could argue that the city man might want to get out into the country on his week-ends so that, as between urban and rural desires under the sky, there would seem little difference.

The presence of waterways in New England and the Seaboard states should have a positive influence on the sales of aircraft but in the East, certainly, such argument fails by facts.

It can't be the tariff, for Kansas claims that the tariff on what she buys adds a burden not shared by the industrial sections; yet Senator Grundy's highly protected state buys fewer airplanes per purchasing power than at least 28 other states, not to mention some others also in the backward class.

Perhaps it's the humidity.

At any rate, here are the figures. Speculate and expectorate as you will, there is ample room for thought. On the Kansas basis, 47 states are un-air-conscious by 62,177 airplanes. Think, brother, think!

THE COLLEGE FLYING FRATERNITY

(*Continued from page* 46)

is still in an embryonic stage, the adversaries of the sport are on the alert to criticize the slightest mishap, and make much ado about the most insignificant injury.

It is to Harvard that we must turn for an example and lesson in safety. Every year this club purchases a new ship and trades in the old one. The "old" one is practically a new one, and always brings a good price in the trade. Harvard's maintenance system is similar to that used by the Army and the big transport companies. Every week a person is chosen to act as inspector. His duty is to supervise the inspection and checking of every vulnerable part of the plane, and he is invested with the absolute right to ground the ship at any time if he conscientiously feels that it is not airworthy. Weekly overhauls are customary at Harvard, and the ritual is enacted whether necessary or not. This hard and tedious work is not without reward. Harvard fliers are never in danger of structural failure or the consequences of poor rigging. The safety practice of the club has inspired the confidence and admiration of the faculty, the parents and aeronautical people everywhere. Harvard has yet to have her first serious accident, and perhaps she never will have one as long as she abides by her present policy.

Extreme care must be taken in the choice of club officers, especially those of the administration group. Because each position is an important one, the officer holding it

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should be chosen particularly on the basis of his adaptability to the duties for which he is responsible. The treasurer, perhaps, has the most unpleasant, and yet the most important, duty of all. He must see that all dues and charges are collected promptly, which is no easy task among a group of indigent collegians. He must watch carefully to prevent the leakage of funds for unimportant and unnecessary things, and yet not be too close-fisted when an expenditure is imperative. The president and vice president should be personable young men who can command the attention of the club at meetings and make these gatherings interesting as well as dignified. The secretary should be able to write much better than the average college man, who is a notoriously bad grammarian.

It might be well to utter a word of warning about internal dissension. No club can hope to succeed with warring factions within, especially one which is skating on such thin ice as the usual college aero society. There must be no hogging of the flying time by anyone, especially the officers who are too often inclined to consider themselves privileged. The student flier is as jealous of his flying time as a dog with a bone, and nothing will rile him more than to see others usurping his place. This brings us back again to the schedule; it is as imperative for social success as it is for financial. The injection of a little fraternal feeling into the club will do as much to hold it together as the most stringent set of rules and regulations.

DR. RUMPLER'S AIRLINER

(*Continued from page* 41)

all-metal flying boat having a single wing with a span of 289 feet. The center lines of the two boat hulls are to be 59 feet apart. The wing at its thickest part will have a height of eight feet. In the leading edge the passenger cabins will be situated. In the center will be the pilots' cabin, projecting forward slightly to afford good vision to all sides. The hulls are to be utilized for the storage of fuel, and the towers connecting them with the wing above will contain the stairways by which the passengers and crew enter the ship.

The plane will have accommodations for 170 persons. Aft of the passenger cabins, extending the entire span of the wing, will be a broad gangway, to the rear of which the engine compartments will be located. The plane is to be powered with ten water-cooled engines connected by means of specially designed shafts with ten propellers arranged along the trailing edge of the huge wing. The whole ship will weigh 115 tons, the fuel 65 tons and the payload 18 tons. The engines will have an output of 1,000 horsepower each, giving the ship a large power reserve. When not fully loaded, it should be able to fly with five of its power units not operating. Economy of operation has received close attention. Calculations which have been made would seem to indicate that this ship, which will have a speed of 185 miles per hour, will pay its way without the aid of subsidies. The ultimate plan is to build a whole fleet of these ships to ply not only between America and Europe, but also across other large bodies of water. Altogether the scheme is one of the most fascinating and promising yet put forward to solve the long-distance flying problem.

TAKING UP THE SLACK

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managed and directed, we owe our ancestors a little sympathy in their similar perplexities.

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The thing that goes on today is the incredible replacement of man-power with machinery. I talked lately to a man who as a boy tended loom in a New England mill. He worked ten hours a day and watched eight machines. Lately he visited the scene of his childhood and found one man working eight hours a day and watching eighty machines. I remember when automobiles were fabricated and assembled by hand, and would sometimes run in spite of it. Today there is a factory which turns raw materials into automobile frames without a single stroke of handiwork. Long after the so-called industrial revolution was over, the workers of the world were still the men and the women and the half-grown boys and girls. Today the real workers are the machines, with men to watch and guide and repair them and sell the stuff they make. And most of this change has happened since the dawn of the Twentieth Century.

It seems, therefore, somewhat silly to blame the current troubles of business and employment on the stock market or any other incident, or to attempt to cure them with an Army and Navy football game. It is much more likely that a percentage of society has worked itself out of a job, and that we must either find more work to do or spread what there is a little more evenly around. Either of which is much easier said than done.

But this secondary industrial revolution has been going on for some time, and this is the first time that it has hurt much. We might consider briefly the likely reasons for this, bearing in mind that we shall eventually arrive at aviation and discover a moral to the tale.

The linotype machine was invented at the end of the last century. Its immediate effect was to put the old-fashioned compositor or type-setter out of work. But its next effect was to create an enormous new industry around the modern newspaper and the modern magazine, an industry impossible under hand-setting methods of printing. In this case the machine created a problem of unemployment and immediately solved it by creating a new industry to absorb the surplus labor—to take up the slack. And the same thing happened in the case of dozens of other inventions and discoveries.

But this sort of thing would not be enough to compensate for the multiplication of man-power by machinery. So the ingenuity of man, which is a perpetual means of getting him out of the consequences of his own short-sightedness, invented and promoted new appetites and took the luxuries of one generation and made them the necessities of the next, and otherwise made two new jobs for every one which was turned over to a machine. And so the world kept busy and prosperous.

And to make sure of it, there have developed within the memory of man certain great industries which haven't any equivalent at all in the dear dead days of handiwork. Among the first half-dozen industries of America, for instance, are the automobile, the movies and the radio. Each of them came along in time to prevent a serious depression, by supplying work to take the place of hard labor turned over by machinery to horsepower. Each of them took up the slack in its turn and time. First the automobile and its countless variations and accessories, then the movies and the talkies and the smellies and what have you, then the radio and all that goes with it. And what comes next, now that horsepower has taken over still more territory and left willing hands with no work to do?

If there is an answer on the horizon, it is aviation. Here is an entirely new industry and opportunity, as yet scarcely

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born into the busy world, but potentially as big as any of the developments that have gone before. How many men are out of work in America today? Certainly five million, possibly seven or eight million. How many will be needed to build the aircraft which this nation will eventually need and use? How many to fly and service them, to man the airports and manage and operate the airlines? How many to supply instruments and accessories, to find fuel and distribute it, to handle cargoes by air and transfer them to surface transportation? If aviation is only a little successful in achieving its ambitions, it will take up the slack of unemployment and ask for more.

We are talking, you see, in terms of the future, and hoping that it will hurry along. I scarcely need to inform you that aviation is not yet hungry for hired help. But if our faith in the future means anything but optimism, it soon will be. Let us consider cheerfully the theoretical possibilities of aircraft construction. It would not be considered a preposterous idea that there should be one airplane in service for every thousand automobiles, but if there were, the factories would need to turn out 26,500 of them at once to supply the United States alone. Nor is it very long—only a single generation—since 10,000 automobiles were plenty for these United States. Today there are 26,500,000 in use and 4,000,000 or 5,000,000 new ones needed every year.

Just at present a single manufacturer could turn out the entire airplane output of these United States. There's just about business enough for one good factory. But let us reflect on the fact that one good American plant could replace every automobile in Russia in a year without straining itself. There are only 30,000 automobiles in all Russia, but not even the profoundest pessimist supposes that 30,000 are enough. A nation 150,000,000 strong can't keep the pace of the present with only 30,000 automobiles, and neither can the 120,000,000 citizens of America get along much longer with less than 10,000 airplanes.

We are encouraged lately by figures from Col. Clarence M. Young's department to the effect that passenger traffic for the first six months of 1930 amounted to more than the totals for all 1929. We are informed of new airways and airports hither and yon. We notice that the nations are talking seriously, though not officially, of a trans-Atlantic mail service. All this is very nice indeed, and a big help to a hopeful disposition. But the basic facts and figures which matter are the number of planes in service and the output of the factories, and in respect to these we are still waiting for real production and distribution, with a proportionate replacement quota to carry the industry along on an even keel.

It is my personal and ignorant opinion that there will be no such thing until private ownership and operation looms much larger in the picture than it does today. We recall, now and then, the history of the automobile. The private owner and driver led the way; he demanded good roads and got them; he appreciated improvements and paid for them. Production of commercial cars followed later. In 1916, for instance, this nation produced 1,525,578 passenger cars and only 92,130 trucks—about one commercial car to every sixteen private cars. But by 1928 they were building 576,540 commercial cars in a year, and the ratio was reduced to one to eight.

More or less of necessity, aviation has approached its own development hind feet foremost, as compared with the automobile industry. The commercial craft is the big idea;

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the private plane at present is incidental. Furthermore, we have laid out an immense system of airways before we have more than a fraction of the traffic they might carry. Probably it couldn't be helped, but very likely it will be corrected. Real production will begin when the average citizen learns to fly, not merely as payload in an air transport, but as an ordinary American going about his personal business and pleasure.

He doesn't do so yet, principally because he knows it isn't safe for him to play with airplanes, though it worries him much less than you might suppose to know that there are more than a million motor accidents on the American highways every year, with 35,000 fatalities—enough to justify a dozen old-fashioned revolutions or a fair-sized war. But the public has undoubtedly been waiting on safety, which is rather unusually sensible of the public. Now that stability, certainty, reliability and safety are being built into aircraft along with the other gadgets, there may soon be a change of pace in the increase of private ownership and operation. Or perhaps it may be the Autogiro which will take the average citizen out of his rut and the smell of somebody else's exhaust and into the free air.

The scene is set, indeed, for an immense increase in aircraft output, enough to take up the slack in unemployment and restore all our faith in Santa Claus. Something like that will be needed to cure a bad case of industrial indigestion, caused by the attempt to absorb and assimilate millions of horsepower produced by modern machinery. We shall do not much more than muddle along, indeed, until a job of work turns up as big as the movies or the radio or concrete construction or any other of the developments that have taken up the slack of other depressions. They were not cured by selling apples, nor by buying three pair of socks instead of two, nor by generous charity, nor by supersalesmanship or psychology. They were cured by discovering a new wood-pile that needed chopping.

Aviation is a child of destiny and has had its share of the breaks. It has already produced more spectacular achievements than any youngster of its size in industrial history. But it hasn't got its growth yet. If it turns the corner soon toward a full-sized service to civilization, as most of us think it will, it will be remembered some day that aviation took up the slack when all the wit and wisdom and experience of the world could only put patches on the threadbare seat of a worn-out prosperity.

For that, as Colonel Hubert Julian would say—who was recently the entire air force of Abyssinia and is still the "Ace of Harlem"—that is the "logicability" of the present economic condition as it concerns the present and future of aviation.

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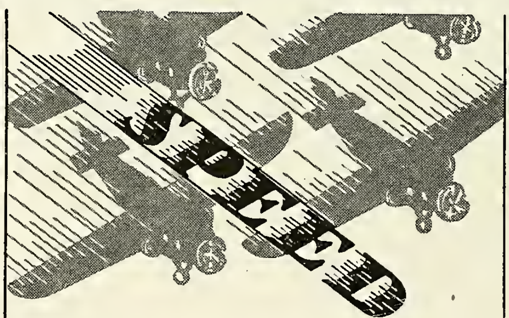

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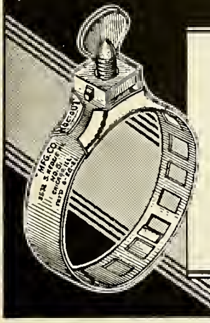

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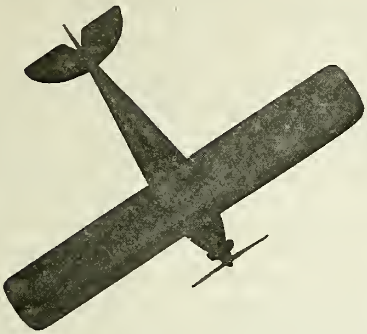

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(*Continued from page 84*)

NOVEMBER

Air mail operations were placed under the provisions of the McNary-Watres Act, which changes the payment to contractors from a poundage to a mileage-space basis. (Nov. 1.)

Capt. Frank Hawks established a new record of 9 hours and 21 minutes for a flight from New York, N. Y., to Havana, Cuba, in the Travel Air Mystery S monoplane *Texaco 13.* He stopped en route at Jacksonville and Miami, Fla. (Nov. 6.)

A round trip transcontinental flight from Rockland, Me., to Los Angeles, Calif, was completed by Stanley Boynton who claimed a new East-West junior coast-to-coast record of 23 hours and 56 minutes; and a West-East record of 20 hours and 29 minutes. (Nov. 9.)

Capt. Frank Hawks flew from Havana, Cuba, to New York, N. Y., in 8 hours and 44 minutes in the *Texaco 13,* establishing a new record for this flight. Stops were made at Miami, Fla., and Charlotte, N. C. (Nov. 9.)

The first non-stop solo flight from New York to the Panama Canal Zone was completed in 24 hours and 35 minutes at France Field, Colon, by Capt. Roy W. Ammel in the *Blue Flash,* a Lockheed "Explorer" monoplane. (Nov. 10.)

(France) The French fliers Goulette and Lalouette landed at Saigon, French Indo-China, establishing a new record of 5 days, 3 hours and 50 minutes for the flight from Le Bourget, Paris. (Nov. 13.)

(France.) The International Aero Show held at the Grand Palais, Paris, France, auspices of the Chambre Syndicale des Industries Aeronautiques. (Nov. 28-Dec. 14.)

DECEMBER

(France.) International Congress of Aerial Security being held at Paris. (Dec. 10-23.)

The National Conference on Uniform Aeronautical Regulatory Laws being held at Washington, D. C. (Dec. 16-17.)

Twenty-seventh anniversary of the Wright brothers' flight of the first man-carrying heavier-than-air machine. (Dec. 17.)

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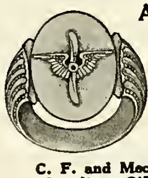

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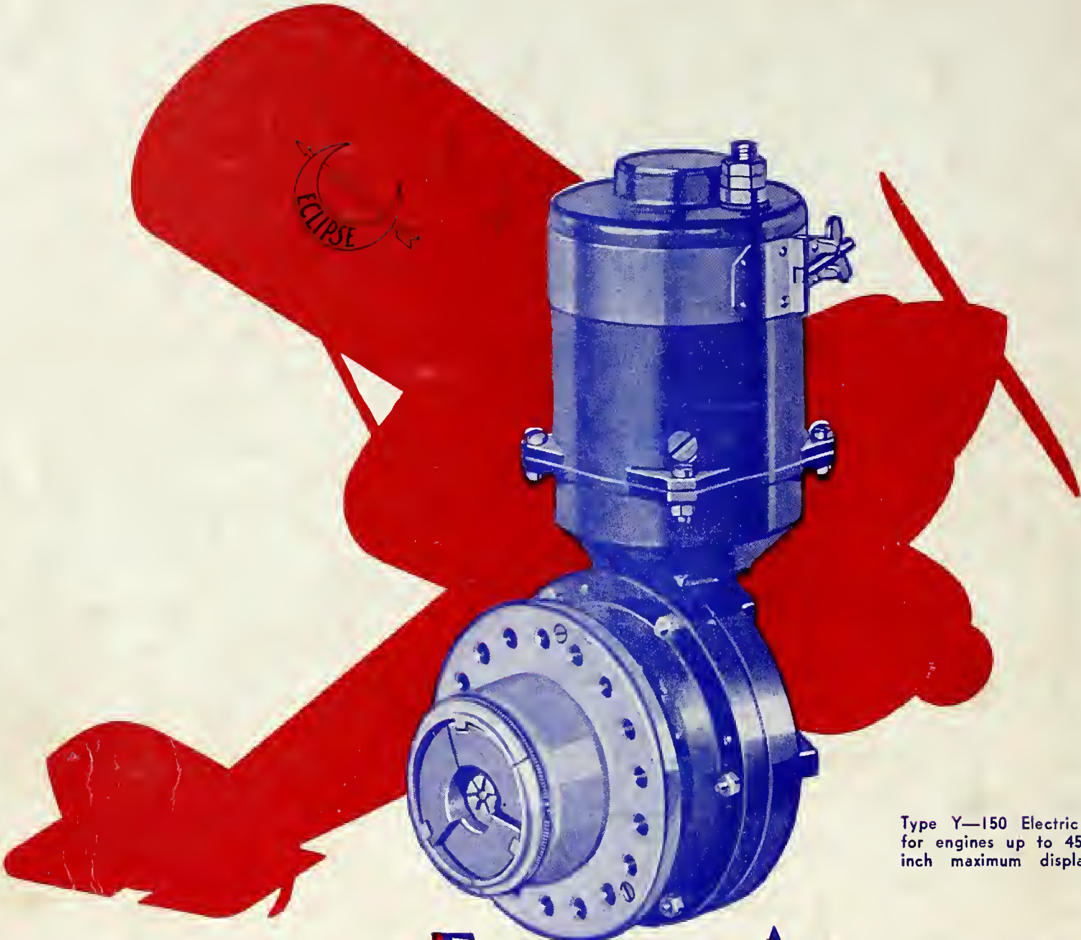
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